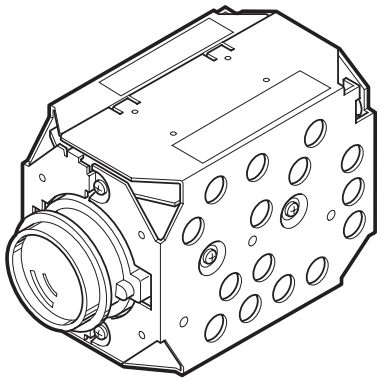
HITACHI

TK | No. 8301E

SERVICE MANUAL

VK-S214R
VK-S214ER



SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

COLOR VIDEO CAMERA

March 2003 Digital Media Division,Tokai

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1 Safety Precaution for Repair

1-1 Cautions

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for a higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual. Electrical components having such features are identified by marking with a ⚠ on the schematics and the parts list in this Service Manual. The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards. Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies for, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.

1-2 Notes When Using Service Manual

The following shows the contents to be noted when using service manual:

1-2-1 Value units used in parts list

Certain symbols are indicated below for value units of resistors, capacitors and coils in parts list. When you read them note the following regular indications:

Parts	Indication in list Regular indication
Resistor	KOHM ····· kΩ
Capacitor	UF ····· μF
	PF ····· pF
Coil	UH ····· μH
	MH ····· mH

1-2-2 Values in schematic diagrams

The values, dielectric strength (power capacitance) and tolerances of the resistors (excluding variable resistors) and capacitors are indicated in the schematic diagrams using abbreviations.

[Resistors]

Item	Indication
Value	No indication ····· Ω
	K ····· kΩ
	M ····· MΩ
Tolerance	No indication ····· ±5%
	(All tolerances other than ±5% are indicated in schematic diagrams)
Power capacitance	No indication ····· 1/8W
	(1/16W for leadless resistors without indication)
	All capacitances other than the above are indicated in schematic diagrams.

[Capacitors]

Item	Indication
Value	No indication ····· μF
	P ····· pF
Dielectric strength	No indication ····· 50V
	(All dielectric strengths other than 50V are indicated in schematic diagrams)

[Coils]

Item	Indication
Value	μ ····· μH
	m ····· mH

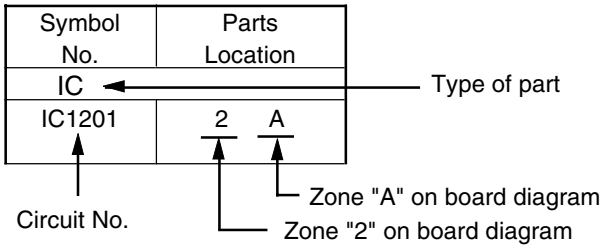
1-2-3 Identifications of sides A/B in circuit board diagrams

1) Board having a pattern on one side and parts on both sides.
   Side A: Shows discrete parts, viewed from the pattern side.
   Side B: Shows leadless parts, viewed from the pattern side.
2) Board having patterns on both sides and parts on both sides.
   Side A: Shows parts and patterns which can be seen when the case is opened.
   Side B: Shows parts and the pattern on the back of side A.

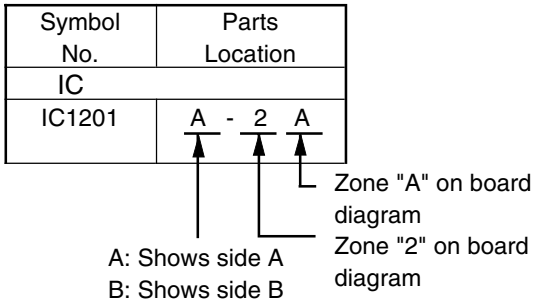
1-2-4 Table for indexing locations of parts

This table shows locations of each part on circuit board diagrams. The locations are indicated using the guide scales on the external lines of diagrams.

1) One diagram indicated for each board



2) Two diagrams indicated for each board



1-3 Electrostatic Protection Measures

Semiconductor components, including optical pickups, may be damaged by static electricity charged on clothes, human body, etc. Take great care when handling it to avoid electrostatic damage.

1-3-1 Grounding for prevention of electrostatic damage

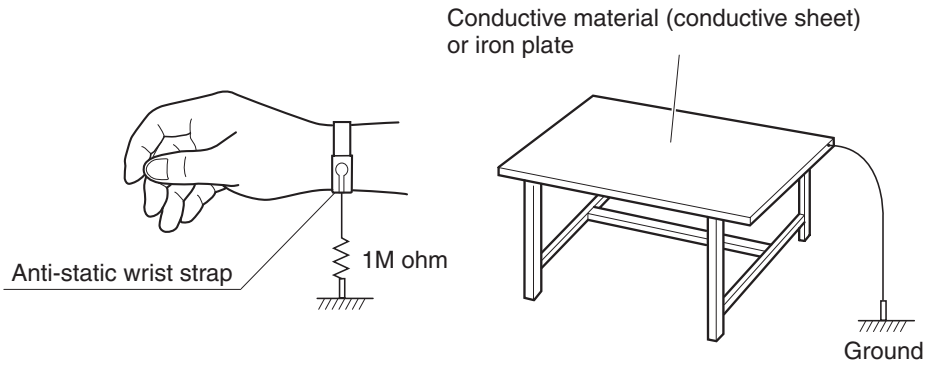
Perform servicing in an environment where grounding is complete.

Grounding work bench

1) Lay out a conductive material (conductive sheet) or iron plate under the work bench on which semiconductor components, such as optical pickups, are placed to ground the bench.

Grounding human body

1) Use an anti-static wrist strap to discharge static electricity charged on human body. Note, however, that static electricity charged on clothes will not be discharged by anti-static wrist strap: Be careful that your clothes do not touch the semiconductor components, such as optical pickups.



1-3-2 Cautions when handling optical pickup - only for DVD products

1) The optical pickup has a high precision structure: Do not subject it to any impact.
2) Do not perform disassembly further than that described in this manual.
3) Never turn the semi-variable resistors in drive unit block.

1-4 Lead-Free Solder

To protect the global environment, lead-free solder is used in this product.
Be sure to read the following before soldering.

Caution

Be sure to wear protective goggles so that no solder smoke or scattered solder enters the eye during servicing. Lead-free solder may scatter at high temperatures (600°C).

1-4-1 Characteristics of lead-free solder

The melting point of lead-free solder is 30-40°C higher than that of lead based solder.

- Composition of alloy (wt%): Sn-3.0Ag-0.5Cu
- Melting temperature: Approx. 220°C

1-4-2 Solder for servicing

It is recommended that you use lead-free solder whose characteristics are the same as that used in this product, although it is also possible to service using lead based solder. However, if lead based solder is used for servicing, some precautions are necessary. (Neglecting these could decrease strength, causing malfunctions.)

Cautions when using lead based solder:

- When replacing components, remove the lead-free solder previously used for soldered points as far as possible.
- For additional soldering, melt lead-free solder completely and mix well with lead based solder. Never perform repair using the bare soldering iron tip without adding solder.

1-4-3 Soldering iron for servicing

It is recommended that you use a soldering iron with thermal control function, with which the temperature at its tip can be set.
Lead-free solder melts at a temperature 30-40°C higher than lead based solder. Therefore, workability will be reduced unless you use a soldering iron whose temperature is high, whose temperature at tip does not change greatly (heat capacity is large), and that can be set to match the work points.

Recommended soldering iron:

- With thermal control function (temperature setting range: 320-450°C)

Recommended tip temperatures for different work points:

Work point	Recommended tip temperature
Circuit board with surface-mounted (chip) parts	320°C ± 30°C
Circuit board without surface-mounted (chip) parts	380°C ± 30°C
Chassis, metal shield	420°C ± 30°C

2 General Description

2-1 Overview

VK-S214R/S214ER is a chassis video camera that incorporates an optical 22-power compact zoom lens.
The signal process circuit is equipped with a digital signal processor (D.S.P. 3R) that is the same as that of VK-S914/S914E.
The external appearance is identical to previous chassis cameras.

2-1-1 Servicing method

Table 2-1-1 shows the method for servicing each circuit board.
Refer to "4 Troubleshooting" for the method of judging defects in each circuit board.

Information:
These servicing methods are subject to change without notice for the purpose of facilitating service procedures.

Table 2-1-1 Circuit Board Servicing Method

Circuit board	Servicing method
CSR circuit board	Component replacement.
PC circuit board	
SP circuit board	

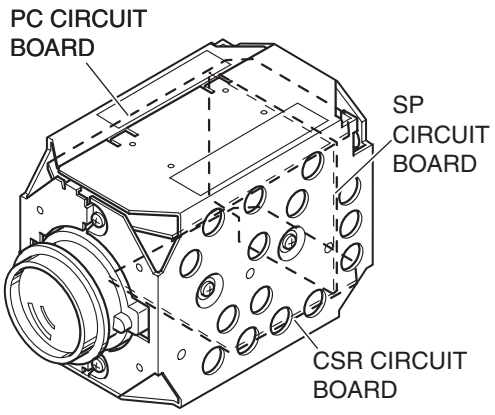


Fig. 2-1-1 Locations of Circuit Boards

2-2 Features

Built-in Optical Power Zoom Lens

A highly reliable optical 22-power zoom lens is mounted, and it is equipped with auto-focus and auto iris functions.

12-Power Digital Zoom Function

The 12-power digital zoom, combined with the 22-power optical zoom, makes possible up to 264-power zooming.

Remote Control via RS-232C

Focus, iris and zoom can be remotely operated via RS-232C.

External Synchronization with AC-Line Pulse Signal

This chassis camera is compatible with external sync using AC-line pulse signal, as well as with internal sync.

2-3 Specifications

The specifications in shaded columns are different from those of previous models
Design and specifications are subject to change without notice.

Item		VK-S214R/S214ER	VK-S914/S914E
Signal Format		VK-S214R: NTSC VK-S214ER: PAL	VK-S914: NTSC VK-S914E: PAL
Scanning System		2:1 Interlacing	2:1 Interlacing
Scanning Frequency	Horizontal	VK-S214R: 15.734 kHz VK-S214ER: 15.625 kHz	VK-S914: 15.734 kHz VK-S914E: 15.625 kHz
	Vertical	VK-S214R: 59.94 Hz VK-S214ER: 50 Hz	VK-S914: 59.94 Hz VK-S914E: 50 Hz
Image Sensor		1/4-inch CCD	1/4-inch CCD
	Total Pixels	VK-S214R: 811 (H) × 508 (V), 410k VK-S214ER: 795 (H) × 596 (V), 470k	VK-S914: 811 (H) × 508 (V), 410k VK-S914E: 795 (H) × 596 (V), 470k
	Effective Pixels	VK-S214R: 768 (H) × 494 (V), 380k VK-S214ER: 752 (H) × 582 (V), 440k	VK-S914: 768 (H) × 494 (V), 380k VK-S914E: 752 (H) × 582 (V), 440k
Lens		F1.6 f = 4 - 88 mm, High Durability ×22 Zoom Lens, Video Auto Focus	F1.4 f = 4 - 64 mm, High Durability ×16 Zoom Lens, Video Auto Focus
	Angle of View	Horizontal 47.3°(Wide), 2.2°(Tele)	Horizontal 47°(Wide), 3°(Tele)
	Min. Distance	1.0m (Tele), 0.01m (Wide)	1.0m (Tele), 0.01m (Wide)
Signal Processing		Digital Signal Processor (D.S.P. 3R)	Digital Signal Processor (D.S.P. 3R)
Sync. System		Internal/External	Internal/External
Camera Functions		(Control through RS-232C)	(Control through RS-232C)
	Optical Zoom	TELE-WIDE (Zoom speed: 3.6s*/6.3s)	TELE-WIDE (Zoom speed: 3.6s*/6s)
	Digital Zoom	Off*/On (Up to 12×)	Off*/On (Up to 2×)
	Video Focus	Auto*/Manual (NEAR-FAR/Fix)	Auto*/Manual (NEAR-FAR)
	White Balance	Auto*/Manual (Red/Blue Gain: UP-DOWN/Fix)	Auto*/Manual (Red/Blue Gain: UP-DOWN)
	Shutter Speed	Auto (Pro-AE)*/Manual (Shutter/Exposure/AGC priority) Shutter speed of VK-S214R: 1/60 - 1/4000 Shutter speed of VK-S214ER: 1/50 - 1/4000	Auto*/Manual Shutter speed of VK-S914: 1/60 - 1/3000 Shutter speed of VK-S914E: 1/50 - 1/3000
	Iris Control	Auto*	Auto*/Manual (Manual Iris Level: UP-DOWN, Auto Iris Cont Level: UP-DOWN)
	Gain Control	----------	Auto*/Manual (Auto Gain Cont Level: UP-DOWN)
	Mosaic	Off*/On	----------
	External Sync.	Off*/On	----------
	Other Control	Communication Speed of RS-232C Position Preset	Position Preset
Sensitivity		2 lx	3 lx
Horizontal Resolution		VK-S214R: More than 470 TV lines VK-S214ER: More than 460 TV lines	More than 450 TV lines
Luminance S/N		More than 50dB	More than 46dB
Video output		Composite: 1.0 ± 0.2Vp-p	Composite: 1.0 ± 0.2Vp-p
Supplied Voltage		9 V - 12 V DC ± 0.5 V	9 V DC ± 0.5 V
Power Requirement		4.0 W (When suppling 9 V DC)	3.2 W (Max.)

*: Default settings

Item	VK-S214R/S214ER	VK-S914/S914E
Operating Temperature	0 - 60° (Recommended: 0 - 40°)	0 - 60° (Recommended: 0 - 40°)
Operating Humidity	10 - 90%	10 - 85%
Dimensions	50 (W) × 60 (H) × 89.5 (D) mm	50 (W) × 60 (H) × 86 (D) mm
Weight	Approx. 218g	Approx. 235g

2-4 Comparison of Main Control ICs

The comparison of main control ICs in shaded columns are different from those of previous models

Item	VK-S214R/S214ER	VK-S914/S914E
Image Sensor	VK-S214R: ICX228AX (IC1001) VK-S214ER: ICX229AK (IC1001)	VK-S914: ICX208AK (IC1001) VK-S914E: ICX209AK (IC1001)
Sensor Drive	µPD16510GR (IC1002)	µPD16510GR (IC1104)
CDS/AGC & A/D Conv.	HD49323AF (IC1101)	HD49322BF (IC1102)
Camera DSP	HG73C012TE (IC1121)	HG73C012TE (IC1103)
Camera µP	HD6432237M15TE (IC1201)	HD6433042ST37F (IC1106)
EEPROM	BR9016RFV (IC1202)	S-29394AFJA (IC1107)
Reset Pulse Gen.	RN5VD27AA (IC1251)	RN5VT28AA (IC1108)
Level Shift	HD74HCT125T (IC1602)	HD74HCT125T (IC1109)
Clock Gen.	TC7SHU04FUL (IC1176)	TC7SU04F (IC1112)
Inverter	TC7SU04FU (IC1177)	TC7SU04F (IC1113)
FV Pulse Gen.	IDC-7S08 (IC1604)	IDC-7S08 (IC1114)
Clock Select	SN74VLC00APW (IC1175)	74HC00 (IC1115)
Clock Gen.	TC7SHU04FUL (IC1174)	TC7SU04F (IC1116)
F.DET./Iris Drive	µPC5023GS-147GJG (IC1351)	µPC5023GS-147GJG (IC1201)
Zoom Motor Drive	TB6512AF (IC1301)	MPC17AT85VM (IC1301)
Focus Motor Drive	TB6512AF (IC1302)	MPC17AT85VM (IC1302)
PWM	TL14641IPT (IC1501)	TL1464IPT (IC1501)
Y/C Mix & Video Amp	BA7665FS (IC1601)	MM1029AT (IC1117)
7.2V Reg.	PQ20WZ51 (IC1502)	Not provided
VCO/Phase Compa.	74VHC4046MTCX (IC1603)	TC5081AP (IC1581)

3 Description of Operation

3-1 Structure Schematics

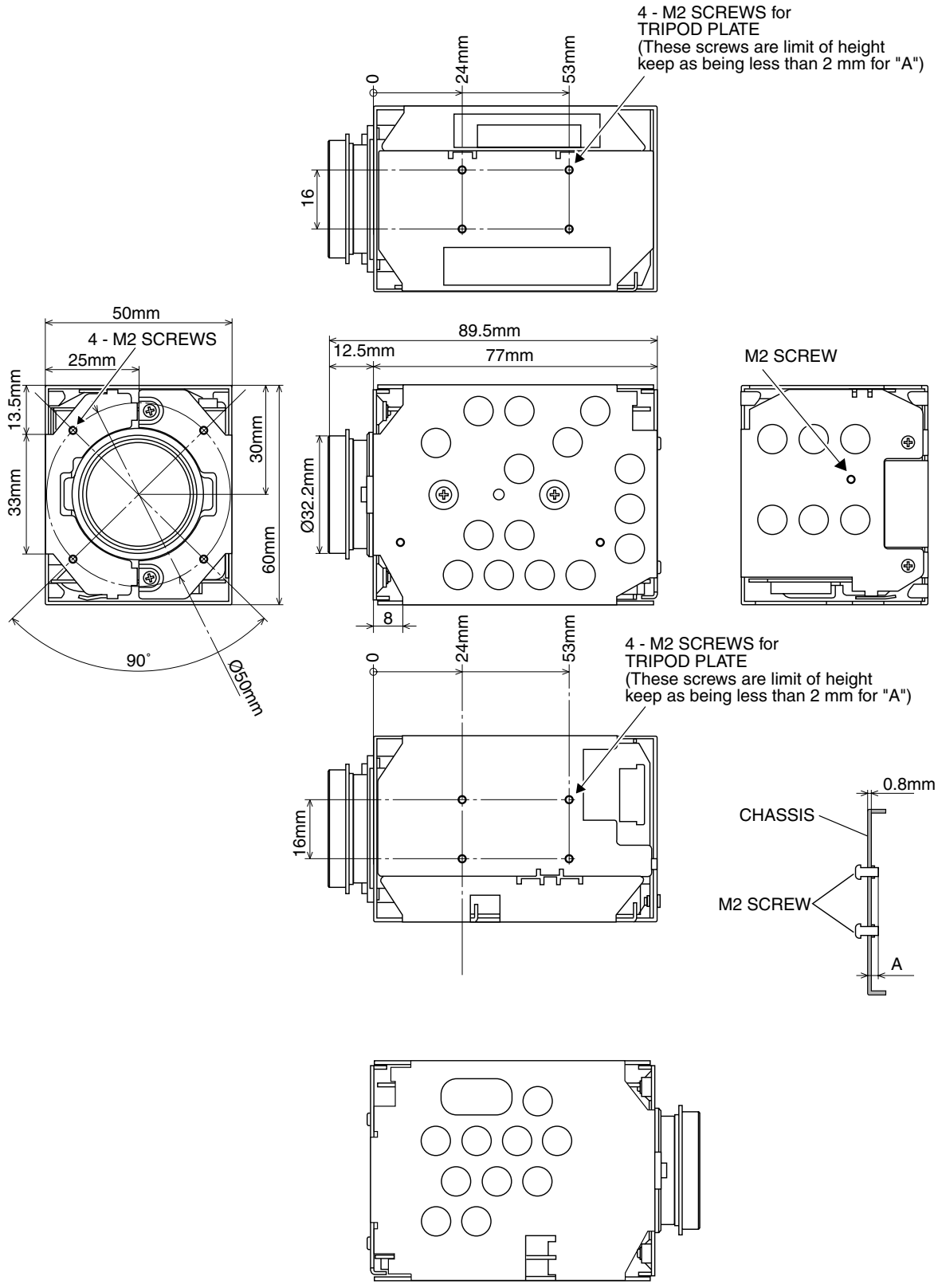


Fig. 3-1-1 Structure Schematics

3-2 Microprocessor Pin Function Table

3-2-1 Camera microprocessor (IC1201: Camera µP)

Pin No.	I/O	Active Level	Abbreviation	Function
1	O	(Pulse)	LD-DSP	Activates data communication with IC1121 (CAMERA DSP).
2	O	(Pulse)	CS-DAC	Not used. Open.
3	O	(Pulse)	CS-VAP	
4	O	Hi	GYRO-RST	
5	-----		CEON	
6	-----		CHARGE	
7	O	(Pulse)	RDOEB	Activates focus drive data communications with IC1302 (FOCUS MOTOR DRIVE).
8	O	(Pulse)	ZDOEB	Activates zoom drive data communications with IC1301 (ZOOM MOTOR DRIVE).
9	O	(Pulse)	RDCK	Outputs focus motor drive signal to IC1302 (FOCUS MOTOR DRIVE).
10	O	(Pulse)	ZDCK	Outputs zoom motor drive signal to IC1301 (ZOOM MOTOR DRIVE).
11	O	(Pulse)	IRDCK	Not used. Open.
12	-----	-----	VCC1	3V power input.
13	I	Hi/Lo	LINE-SW	External sync detection input. When "Hi" is input, the unit will be driven in the external sync mode; when "Lo" is input, it will be driven in the internal sync mode.
14	-----	-----	GND1	Ground.
15	O	Hi/Lo	IRDCW	Not used. Open.
16	O	(Pulse)	IROREB	
17	O	Hi	IR-RESET	
18	I	(Pulse)	IR-SENS	
19	O	-----	IR-LED	
20	-----	-----	----------	
21	-----	-----	TST-PIN1	
22	I	0V-3V	CRTN-CNE	Supplies pulse to IC1121 (CAMERA DSP) to control the wipe fade operation.
23	-----	----	TST-PIN0	Not used. Open.
24	I	0V-3V	V-VAP	
25	-----	-----	CHECK8	
26	O	Hi	ZD-RESET	Resets IC1301 (ZOOM MOTOR DRIVE).
27	O	Hi	RD-RESET	Resets IC1302 (FOCUS MOTOR DRIVE).
28	O	(Pulse)	IRIS-PWM	Iris motor drive output .
29	-----	-----	LD-JIG	Not used. Open.
30	O	(Pulse)	ZOOM-LED	Output pulses to drive the ZOOM LED in the lens block via Q1201 (LED DRIVE).
31	-----	-----	TXD2	Not used.
32	-----	-----	RXD2	
33	O	(Pulse)	FCUS-LED	Output pulses to drive the FOCUS LED in the lens block via Q1201 (LED DRIVE).
34	O	Hi/Lo	ZDCW	Issues a command which determines with IC1301 (ZOOM MOTOR DRIVE).
35	O	(Pulse)	RDCW	Issues a command which determines with IC1302 (FOCUS MOTOR DRIVE).
36	I	(Pulse)	HD	Inputs horizontal sync from IC1121 (CAMERA DSP).
37	O	-----	RD-PWMA	Not used. Open.

Pin No.	I/O	Active Level	Abbreviation	Function
38	I	(Pulse)	FV	Receives the vertical sync pulses that detect the iris detection area, from IC1121 (CAMERA DSP).
39	I	(Pulse)	FCUS-SEN	Focus motor position detection input.
40	-----	-----	NC2	Not used. Open.
41	I	(Pulse)	ZOOM-SEN	Zoom motor position detection input.
42	-----	-----	GND2	Ground.
43	O	0V-3V	HAL-ADJ1	Controls the offset voltage of IC1351 (F.DET/IRIS DRIVE).
44	O	0V-3V	HAL-ADJ0	Drives bias generator in IC1351 (F.DET/IRIS DRIVE) via Q1351 (BIAS DRIVE) to control the bias voltage of the Hall devices.
45	-----	-----	NC3	Not used. Open.
46	I	0V-3V	ZOOM-SW	Not used.
47	I	0V-3V	FOCUS-SW	
48	I	0V-3V	KEY1	
49	I	0V-3V	TEMP-ADJ	Temperature change detection input. Detects variations in the forward voltage at the connected diode to correct the back-focus.
50	I	0V-3V	V-GYRO	Not used. Connect to ground.
51	I	0V-3V	H-GYRO	
52	I	0V-3V	FDET	F-value detection input. Receives the F.DET voltage detected by IC1351 (F.DET/IRIS DRIVE) and compares this with the reference voltage input via pin 53 to detect the F-value.
53	-----	-----	AVCC1	Reference 3V power input.
54	-----	-----	AVCC2	A/D reference voltage input (connected to 3V power supply).
55	-----	-----	VCC2	3V power input.
56	-----	-----	VCC3	
57	-----	-----	NC4	Not used. Open.
58	-----	-----	NC5	Not used. Connect to ground.
59	I	Lo	SYS-REST	Reset signal input from IC1203 (RESET PULSE GEN.).
60	-----	-----	VCC4	3V power input.
61	-----	-----	STBY	Not used. Connect to 3V power supply.
62	-----	-----	VCC5	3V power input.
63	I	(Pulse)	XTAL	Drive X1241 to generate 10MHz main clock pulse.
65	O	(Pulse)	EXTAL	
64	-----	------	GND3	Grounded.
66	I	Lo	FWE	Not used.
67	I	Hi	MD2	
68	-----	-----	NC6	Not used. Open.
69	O	Hi	HALL-G	Controls the amplification (gain of Hall device) of IC1351 (F.DET/IRIS DRIVE).
70	-----	-----	NC7	Not used. Open.
71	-----	-----	NC8	
72	I	(Pulse)	HD	Inputs horizontal sync from IC1121 (CAMERA DSP).
73	-----	-----	SHUT-CTL	Not used. Open.
74	-----	-----	STROBE	
75	I	(Pulse)	FP	Inputs field discrimination pulse from IC1121 (CAMERA DSP).
76	O	(Pulse)	SD[232C]	Used for initial settings and adjustment. For data communications with personal computer.
77	I	(Pulse)	RD[232C]	
78	I	(Pulse)	EP3	Receives pulses which discriminate the iris detection area.

Pin No.	I/O	Active Level	Abbreviation	Function
79	-----	-----	NC9	Not used. Open.
80	-----	-----	NC10	
81	-----	-----	NC11	
82	-----	-----	NC12	
83	O	(Pulse)	SDO	For data communications with IC1121 (CAMERA DSP), IC1202 (EEPROM).
84	I	(Pulse)	SDI	
85	O	(Pulse)	SCLK	
86	-----	-----	DC-LIGHT	Not used. Open.
87	-----	-----	NC13[1]	
88	I	(Pulse)	4800SET	Not used.
89	-----	-----	LIGHT-SW	Not used. Open.
90	I	Hi	COLOR/BW	Color model and B/W model select input. (Hi: Color model/Lo: B/W model)
91	-----	-----	NC13[2]	Not used. Open.
92	-----	-----	F-DIAL1	
93	-----	-----	F-DIAL2	
94	-----	-----	LIGHT-0	
95	-----	-----	BPF-NTPL	
96	O	(Pulse)	CLK-CDS	Transfer data to IC1101 (CDS/AGC & A/D CONV.).
97	O	(Pulse)	SDO-CDS	
98	O	(Pulse)	CS-CDS	Activates data communications with IC1101 (CDS/AGC & A/D CONV.).
99	O	(Pulse)	CS-EENT[1]	Activates data communications with IC1202 (EEPROM).
100	O	(Pulse)	CS-EENT[2]	Not used. Open.

4 Troubleshooting

4-1 Trouble Diagnosis

4-1-1 Setting to service position

Remove chassis R and chassis L, referring to "5. Disassembly and Reassembly", and connect the camera as shown in Fig. 4-1-1.

Note:
To prevent short-circuit, always perform trouble diagnosis of camera on insulated mat.

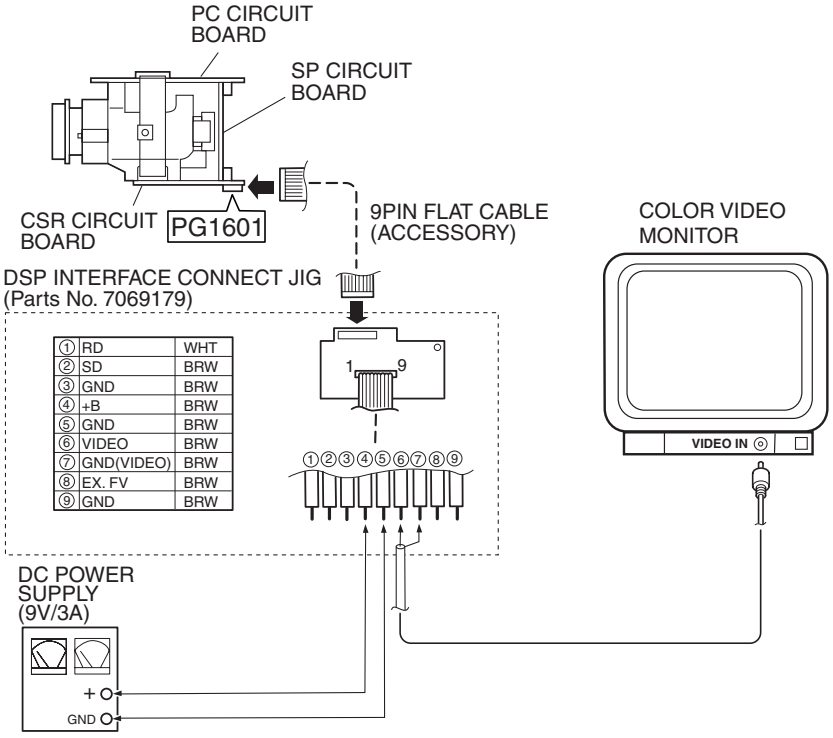
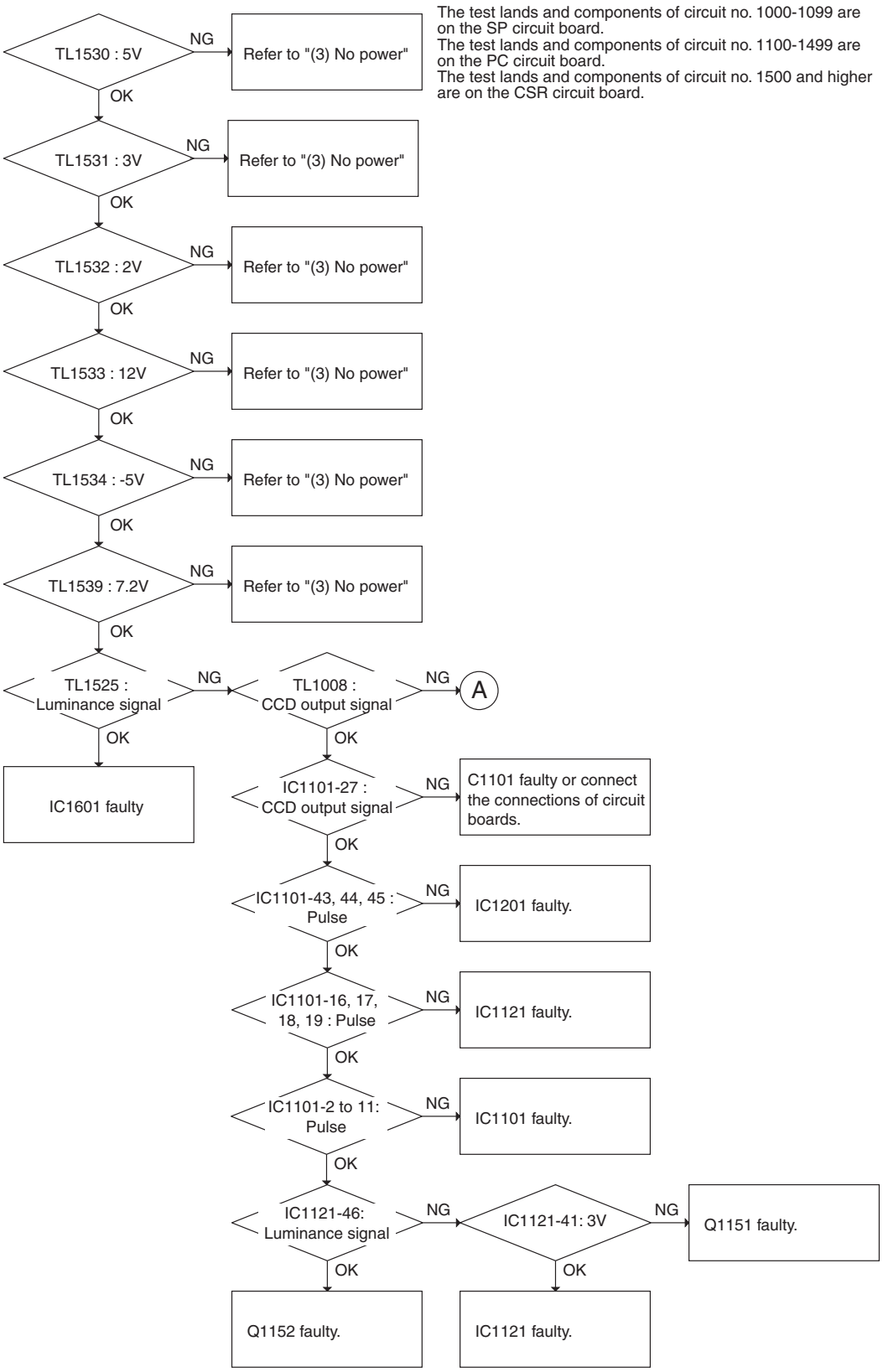
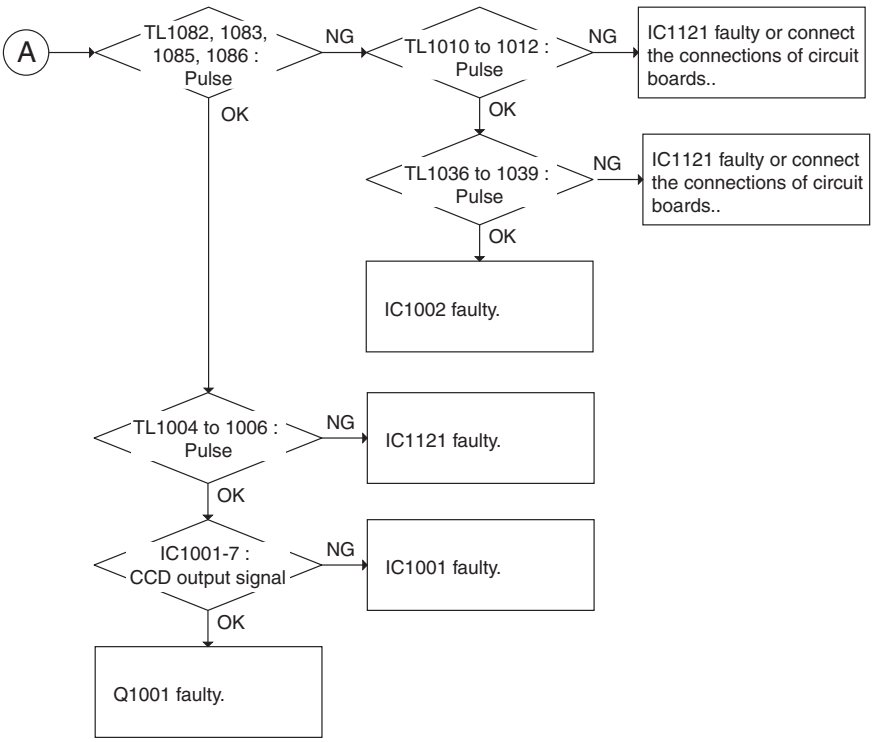


Fig. 4-1-1 Connections for Trouble Diagnosis

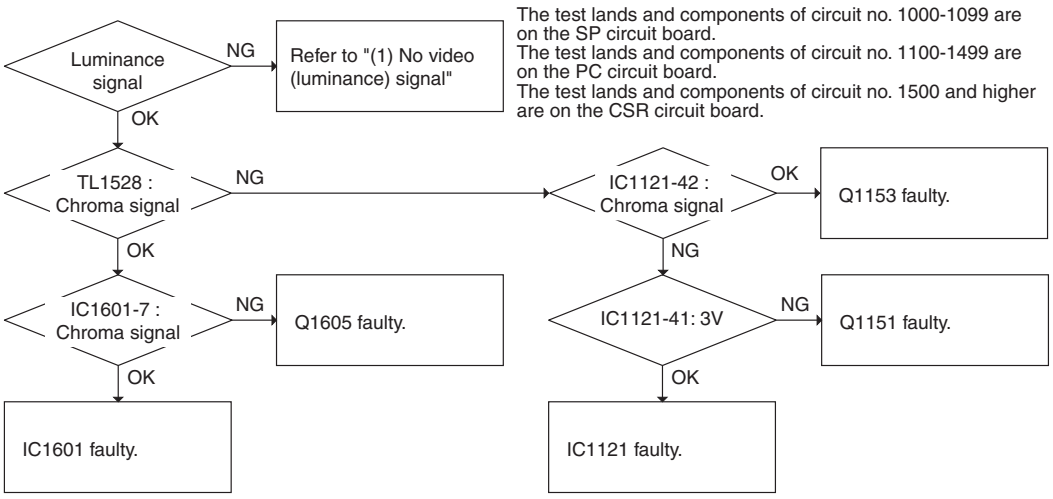
4-1-2 Trouble diagnosis flowchart

(1) No video (luminance) signal





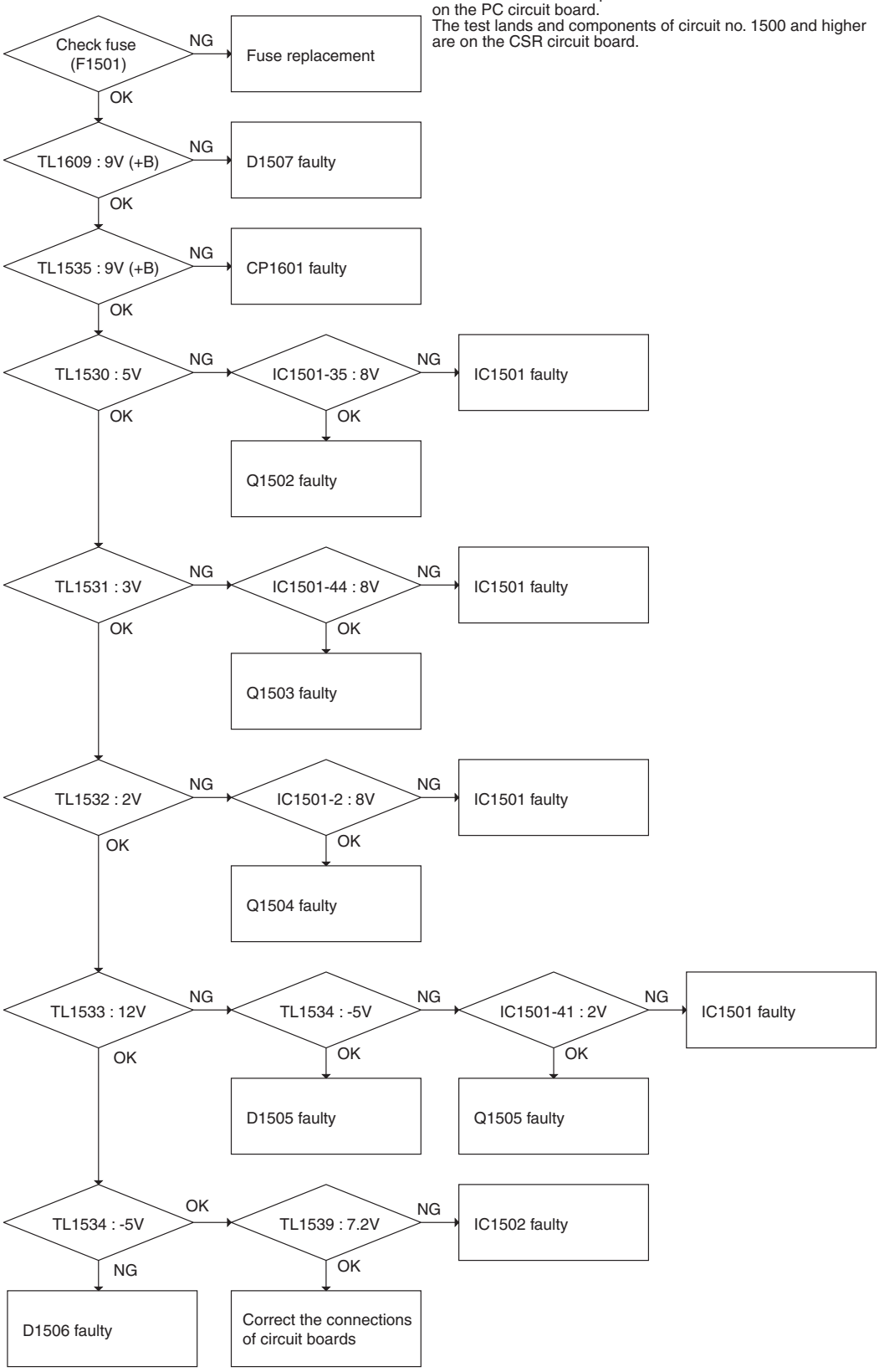
(2) No chroma signal



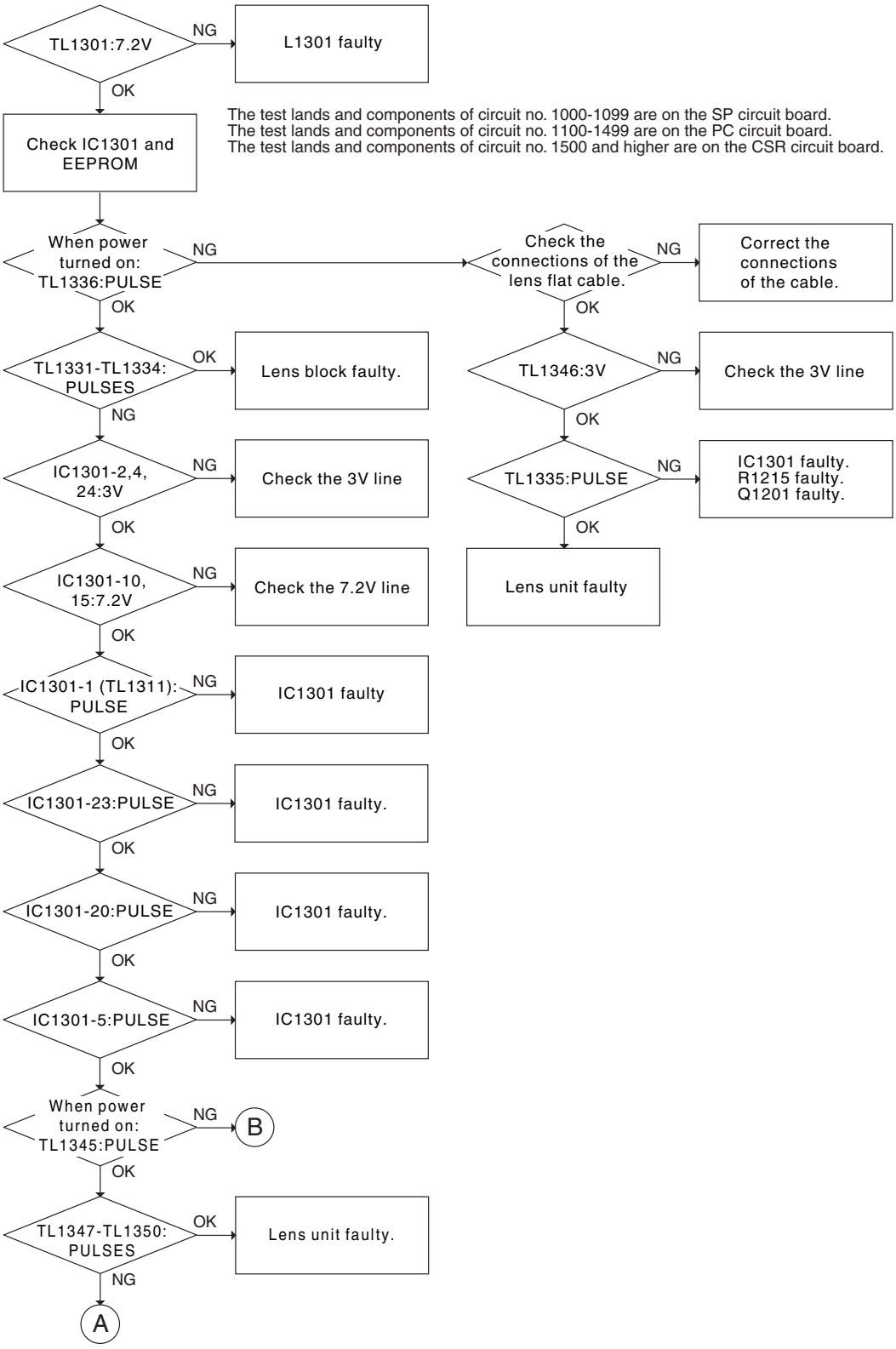
The test lands and components of circuit no. 1000-1099 are on the SP circuit board.
The test lands and components of circuit no. 1100-1499 are on the PC circuit board.
The test lands and components of circuit no. 1500 and higher are on the CSR circuit board.

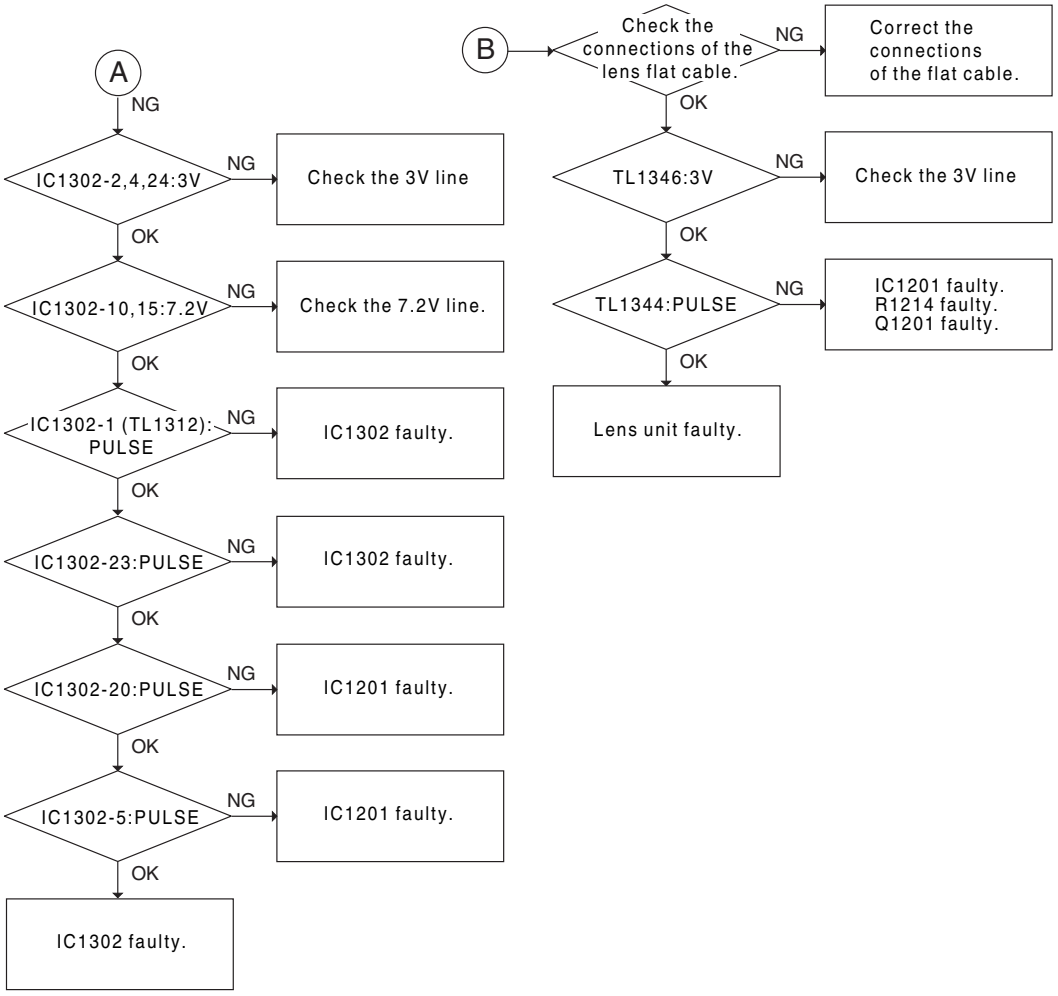
(3) No power

The test lands and components of circuit no. 1000-1099 are on the SP circuit board.
The test lands and components of circuit no. 1100-1499 are on the PC circuit board.
The test lands and components of circuit no. 1500 and higher are on the CSR circuit board.

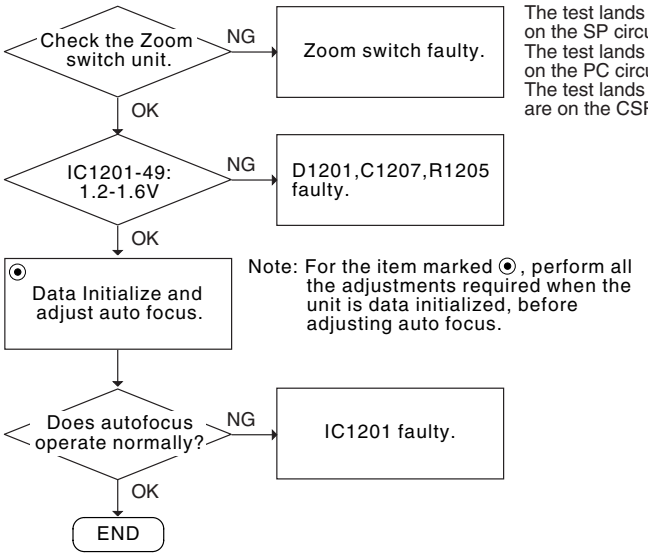


(4) No zoom and focus operation





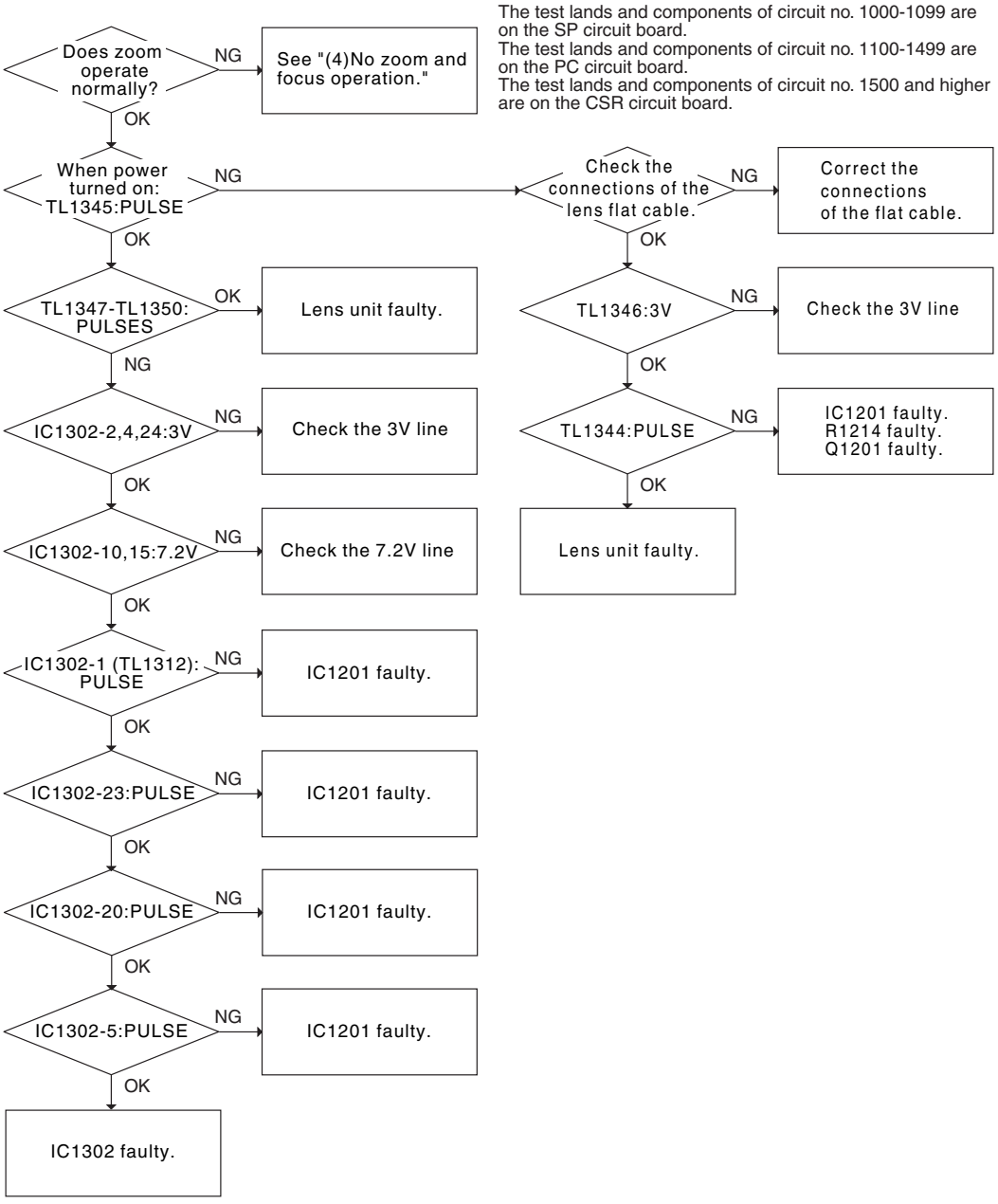
(5) Subject is greatly out-of-focus when zoomed



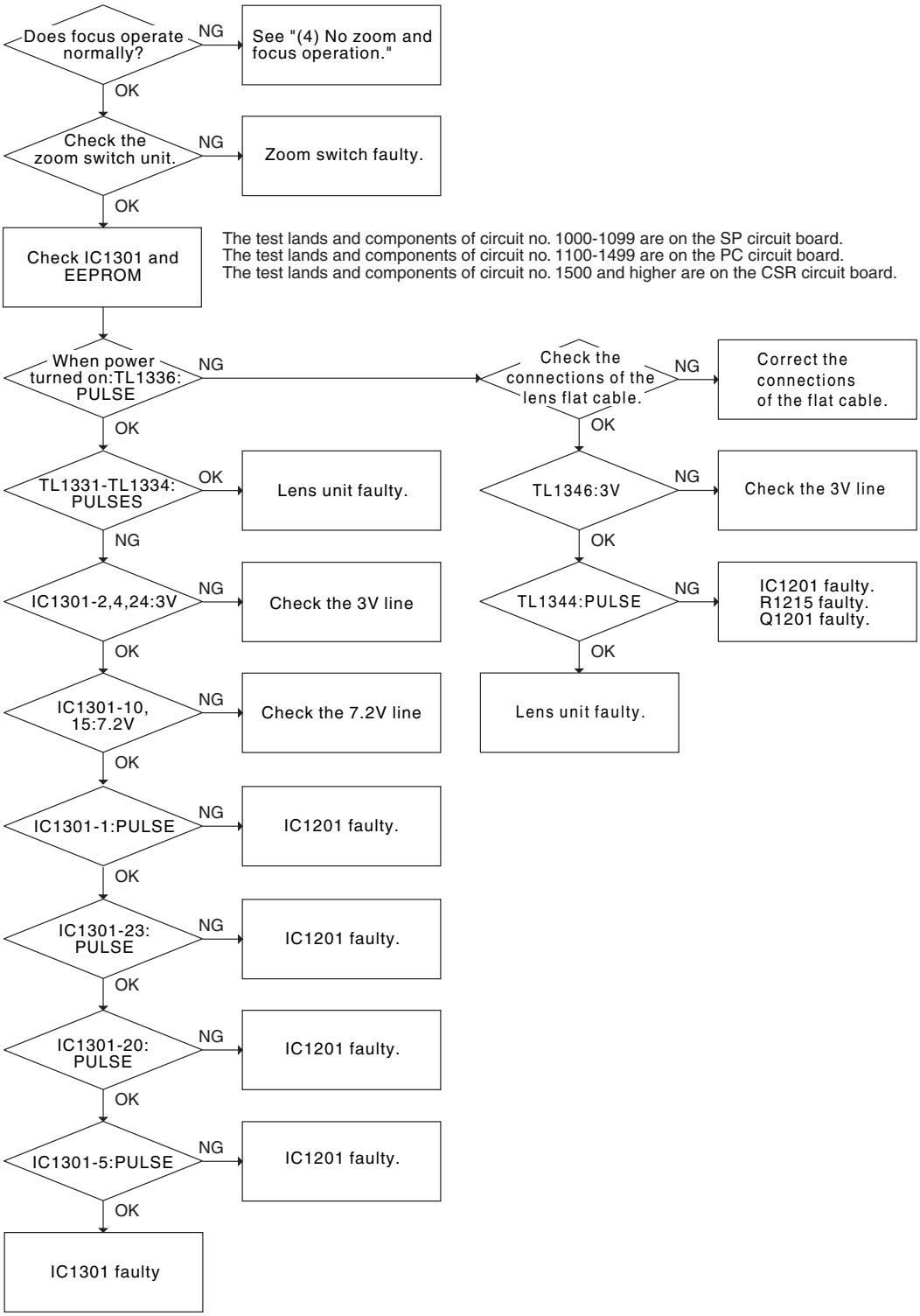
Note: For the item marked ⦿, perform all the adjustments required when the unit is data initialized, before adjusting auto focus.

The test lands and components of circuit no. 1000-1099 are on the SP circuit board.
The test lands and components of circuit no. 1100-1499 are on the PC circuit board.
The test lands and components of circuit no. 1500 and higher are on the CSR circuit board.

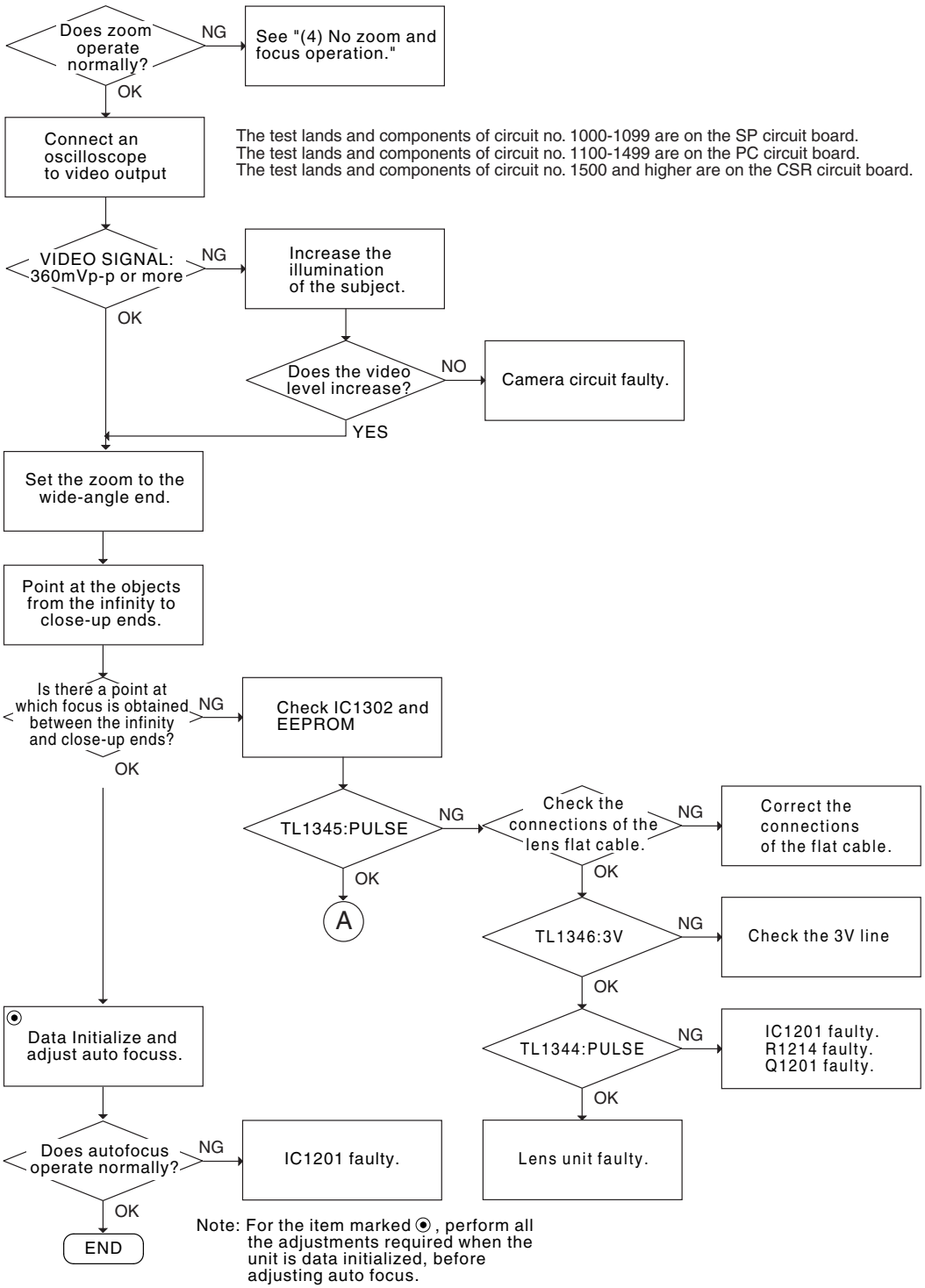
(6) No focus lens operation

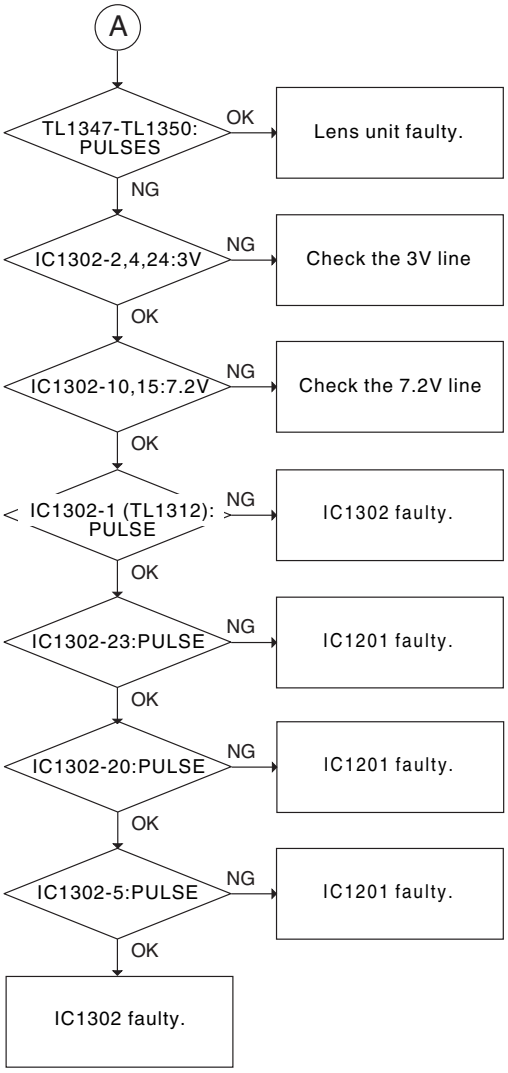


(7) No zoom operation



(8) No auto focus operation


Does zoom operate normally?
NG
See "(4) No zoom and focus operation."
OK
Connect an oscilloscope to video output
The test lands and components of circuit no. 1000-1099 are on the SP circuit board.
The test lands and components of circuit no. 1100-1499 are on the PC circuit board.
The test lands and components of circuit no. 1500 and higher are on the CSR circuit board.
VIDEO SIGNAL: 360mVp-p or more
NG
Increase the illumination of the subject.
OK
Does the video level increase?
NO
Camera circuit faulty.
YES
Set the zoom to the wide-angle end.
Point at the objects from the infinity to close-up ends.
Is there a point at which focus is obtained between the infinity and close-up ends?
NG
Check IC1302 and EEPROM
OK
TL1345:PULSE
NG
Check the connections of the lens flat cable.
NG
Correct the connections of the flat cable.
OK
A
TL1346:3V
NG
Check the 3V line
OK
Data Initialize and adjust auto focuss.
TL1344:PULSE
NG
IC1201 faulty.
R1214 faulty.
Q1201 faulty.
OK
Does autofocus operate normally?
NG
IC1201 faulty.
Lens unit faulty.
OK
END
Note: For the item marked ⦿, perform all the adjustments required when the unit is data initialized, before adjusting auto focus.


A
TL1347-TL1350: PULSES
OK
Lens unit faulty.
NG
IC1302-2,4,24:3V
NG
Check the 3V line
OK
IC1302-10,15:7.2V
NG
Check the 7.2V line
OK
IC1302-1 (TL1312): PULSE
NG
IC1302 faulty.
OK
IC1302-23:PULSE
NG
IC1201 faulty.
OK
IC1302-20:PULSE
NG
IC1201 faulty.
OK
IC1302-5:PULSE
NG
IC1201 faulty.
OK
IC1302 faulty.

5 Disassembly and Reassembly

5-1 Order of Disassembly

Refer to “Disassembly Flowchart” in Fig. 5-1-1 for the order of removing components. When reassembling components, use the reverse order to removal unless otherwise specified.

Note:
When replacing components in the VK-S214R/S214ER, be sure to use only those shown in "Replacement Parts List".

Reading Disassembly Flowchart:

After locating the target component in the flowchart, remove all components of the target in sequence, following the arrows (routes) from the top of flowchart.

Component name	Item No.
•Chassis R •Chassis L	1) and 2)
↓	
•PC Circuit Board	3) to 5)
↓	
•CSR Circuit Board	6) and 7)
↓	
•SP Circuit Board •Image Sensor	8) and 10)
↓	
•Lens unit	11)

Fig. 5-1-1 Disassembly Flowchart

5-2 Disassembly

Information:
Numbers in figures are step numbers in disassemble procedure, and letters in brackets [ ] show the types of screw.

◆ Chassis L and R (Fig. 5-2-1)

1) Remove four screws [A] and remove the chassis L.
2) Remove two screws [A] and remove the chassis R.

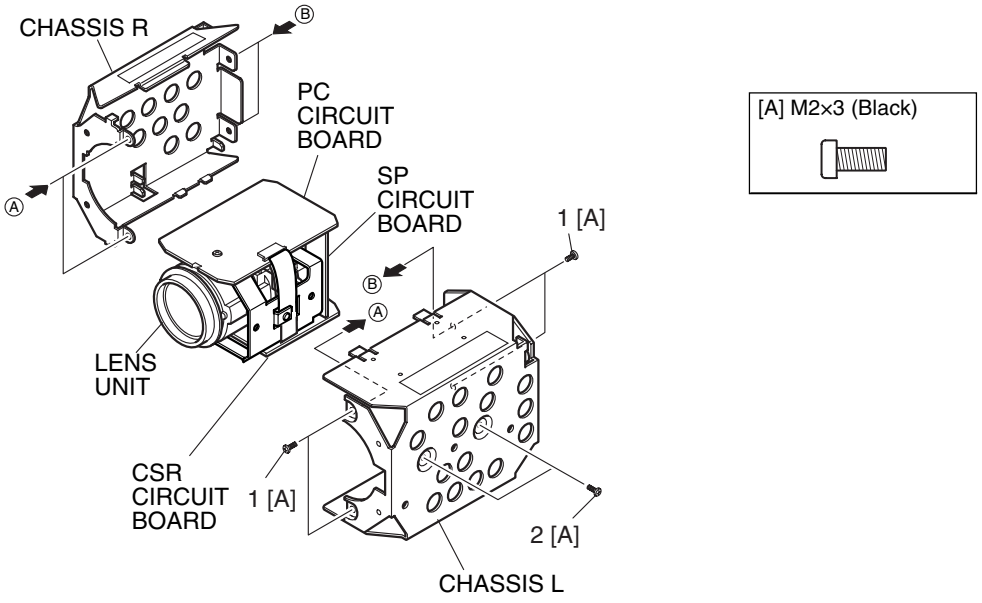


Fig. 5-2-1 Chassis L and R

◆ PC Circuit Board (Fig. 5-2-2)

3) Disconnect the flat cable from the PC circuit board.
   To connect flat cables, perform the procedure in Fig. 5-2-3.
4) Remove one screw [B].
5) Remove the PC circuit board in the direction of the arrow.

◆ CSR Circuit Board (Fig. 5-2-2)

6) Remove one screw [B].
7) Remove the CSR circuit board in the direction of the arrow.

◆ SP Circuit Board and Image Sensor (Fig. 5-2-2)

8) Remove two screw [C] and remove image sensor assembled with SP circuit board, the crystal filter and rubber also removed. Be careful not damage and lost them.
9) Unsolder the terminals (fourteen points) of image sensor on the SP circuit board.
10) Remove two screw [D] and remove image sensor form the SP circuit board.

◆ Lens Unit (Fig. 5-2-2)

11) Remove three screws [C] and remove the camera chassis for the lens unit.

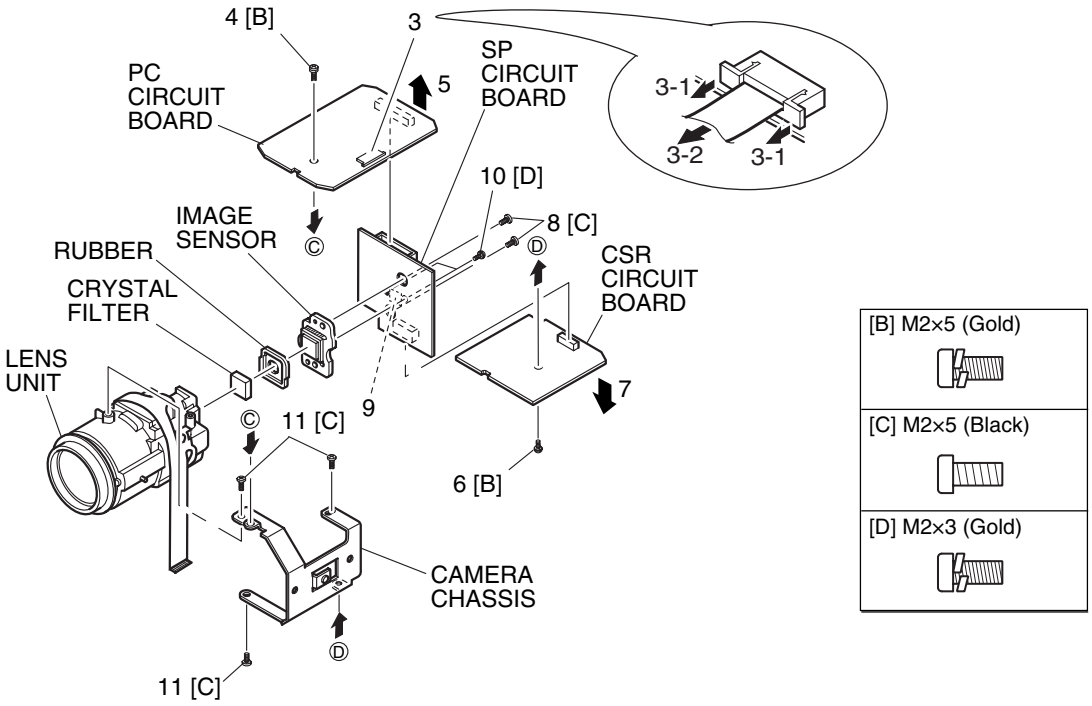


Fig. 5-2-2 PC, CSR, SP Circuit Boards, Image Sensor and Lens Unit

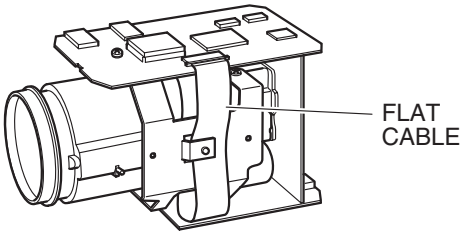


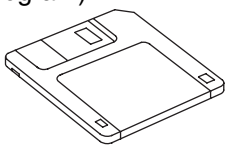
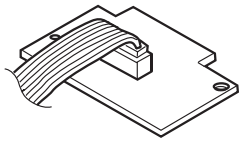
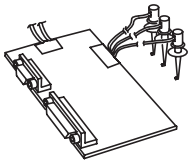
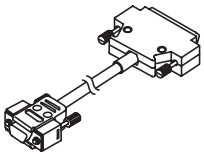
Fig. 5-2-3 Connecting Flat Cable

6 Adjustment

6-1 Preparations for Adjustment

All adjustments are performed using the adjustment program (ZMAP: Zoom camera Manual Adjustment Program) and personal computer (PC). If error message appears during adjustment, refer to "6-8 Error Messages and Countermeasure".

6-1-1 List of equipment and jigs

New Adjustment Floppy Disk (Adjustment Program)*1 	DSP Interface Connect Jig No. 7069179 	DSP-R Jig No.7099448 	C12 Light Balancing Filter No.7099369
Personal Computer (PC) [Goods on the Market]	RS-232C Cable (9 or 25 pins) Straight Type [Goods on the Market] 		

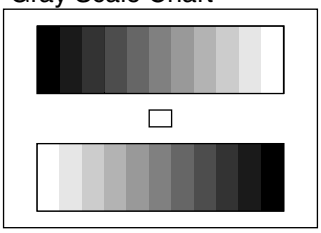
*1: The adjustment floppy disk is not for sale: It will be supplied only when service maintenance contract is concluded.

6-1-2 List of test equipment and charts

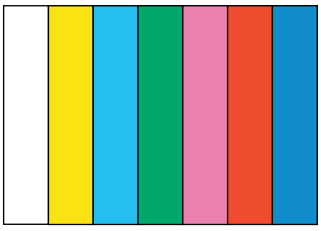
1) Gray scale chart
2) Color bar chart
3) Backfocus chart
4) Oscilloscope
5) Vectorscope
6) Digital voltmeter (DVM)
7) 3100K light box
8) DC power supply for the video camera
9) DC power supply for the DSP-R jig

Information:
If no vectorscope is available, use an oscilloscope instead: Note, however, that the adjustment accuracy will be lower.

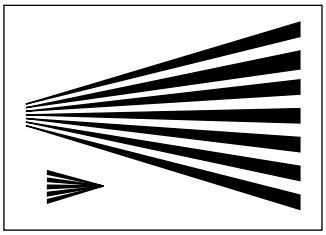
Gray Scale Chart



Color Bar Chart



Backfocus Chart



6-1-3 Connections for adjustment

Connect the video camera to the test equipment and jigs as shown in Fig. 6-1-1

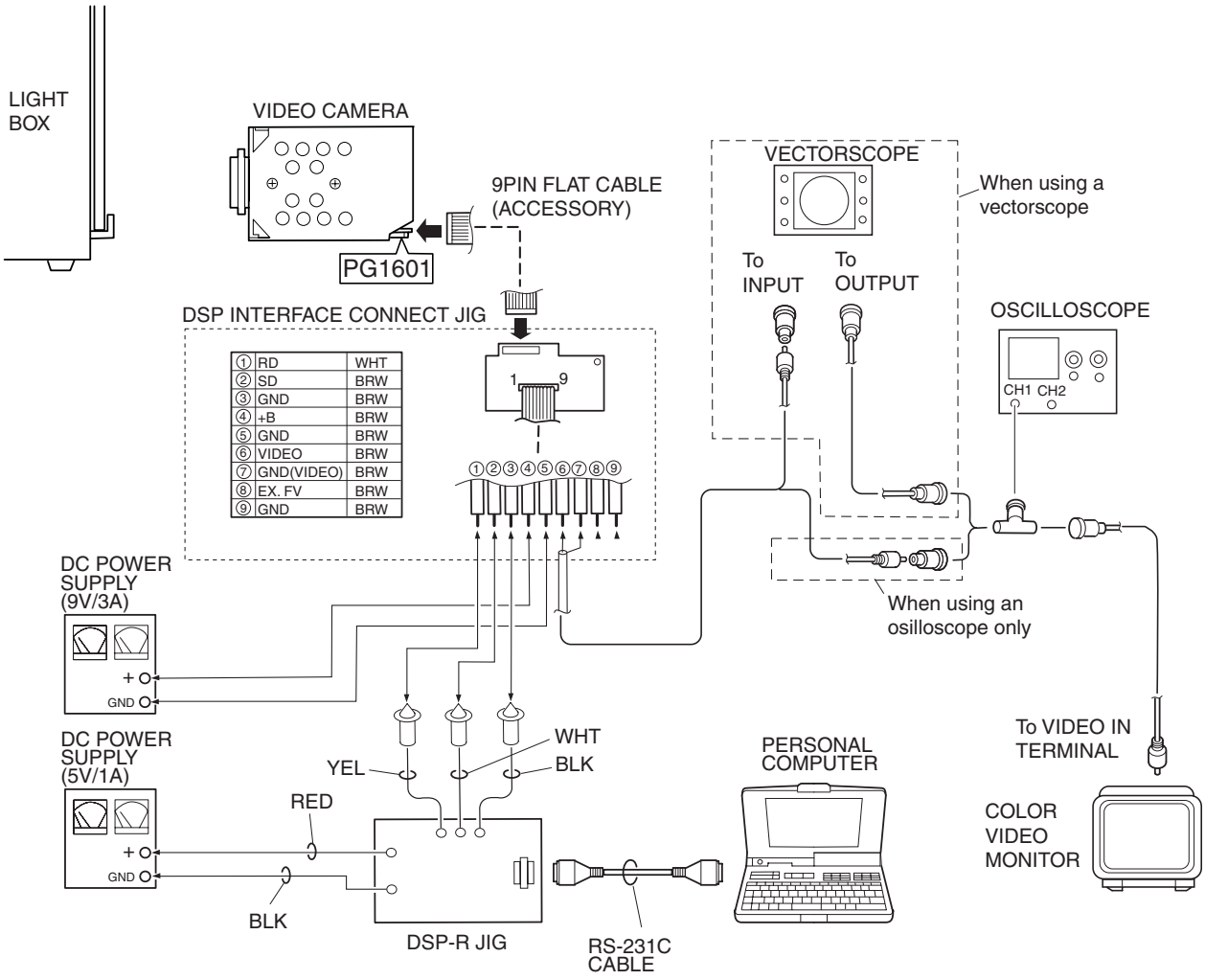


Fig. 6-1-1 Connections for Adjustment

Note:

1) The adjustment program will not operate normally unless the video camera, PC and DSP-R jigs are all turned on.
2) Take care with the following when pointing the video camera at a chart (light box):
   a) Focus the chart correctly.
   b) Set the chart (light box) 30-50 cm away from the lens surface, and avoid any effects from surrounding light (except for a case where some designation is given).
3) Be sure to connect the video output of video camera to a color video monitor (terminate the video output with 75 ohm):
   If the video output is not connected to the monitor (and if it is not terminated with 75 ohm), the output video signal level cannot be measured correctly.
4) Use light box that does not flicker and whose color temperature is controlled, for adjustment. If an inappropriate light box is used, precise adjustment will not be possible, and the adjustment program will not operate normally.

6-1-4 Setting test equipment

(1) Oscilloscope

The names of switches, knobs, modes, etc. of oscilloscope may vary slightly depending on the manufacturer or model. Since some oscilloscopes may have switches, etc. other than the above that must be set, see the instruction manual of the particular oscilloscope for details.

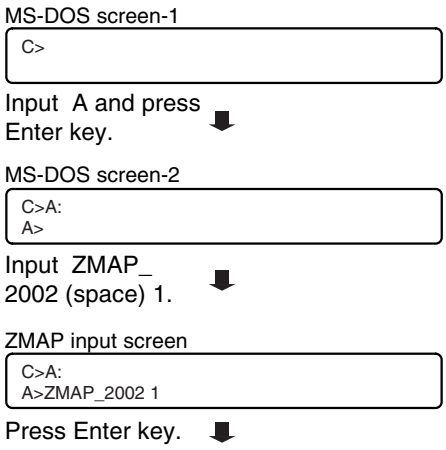
1) Probe: 10:1
2) TIME/DIV: 10 or 20 μs (except for a case where some designation is given)
3) VOLTS/DIV: Will vary depending on the measurement object (except for a case where some designation is given)
4) Synchronization: Internal sync (except for a case where some designation is given)
5) AC/DC/GND: AC (except for a case where some designation is given)

(2) Vectorscope

1) SATURATION: 75%

6-1-5 Starting adjustment program (ZMAP)

1) Connect the video camera, DSP-R jig and PC as shown in Fig. 2-1, and supply power to them. If the connection of jig, etc. is inappropriate or power is not supplied, the adjustment program will not start normally.
2) Operate the PC to start MS-DOS. For details on how to start MS-DOS, refer to the instruction manual of PC, since this varies for each PC.
3) Make sure that the adjustment floppy disk is write-protected.
4) Insert the adjustment floppy disk into the floppy disk drive of PC.
5) Use the PC keyboard to type **A:** and press **Enter** key. (See the MS-DOS screen-1 and 2)
   The letter to be input is to designate the drive into which the adjustment floppy disk has been inserted. If using a drive other than A, designate the drive.
6) Input **ZMAP_2002** (space) **1** and press **Enter** key. (See the ZMAP input screen)
   The number to be input after a space is to designate the serial port no. of PC. If the PC has two or more serial ports, and the DSP-R jig is connected to a port other than serial port 1, input the serial port number.



7) The ZMAP will start: Make sure that the model select screen appears on the PC display. (See the model select screen)
   If the model select screen does not appear, make sure of the following:
   a) Power is supplied to the video camera and DSP-R jig.
   b) The designation of drive (in step 5) is correct.
   c) The designation of serial port is correct.
   d) The correct adjustment floppy disk has been correctly inserted.
8) If the appropriate model is displayed on the model select screen, input the number to PC. If the appropriate model name is not shown on the model select screen, input P to PC until the model name appears. If an erroneous model name or number is selected, misoperation message will appear on PC display: Press any key to restore the model select screen.
9) The screen for verifying the model name will appear on PC display: If it is correct, input **Y** to PC. If it is incorrect, input N and start over (from step 8).
10) Make sure that the main menu appears on PC display: If it does not appear, check whether model selection (in step 8) is correct.

Model select screen

```
**********************************************************
                    MODEL SELECT
**********************************************************

          [1]     xxxxxxxx
          [2]     xxxxxxxx
          [3]     xxxxxxxx
          [4]     xxxxxxxx
          [5]     xxxxxxxx
          [P]     NEXT SELECTION
          [ESC]   END

        Please select the type of the set
        Press [1] - [5] or [P] or [ESC]
```

Model select (Input the number).

Screen for verifying model name

```
        Selected model is xxxxxxxx
        Are you sure ?  (Y/N)
```

Input Y.

Main menu

```
**********************************************************
                MANUAL ADJUSTMENT PROGRAM
**********************************************************

          [A]     DATA INITIALIZE
          [B]     ELECTRIC VOLUME
          [C]     ADJUSTMENT
          [D]     AUTO FOCUS
          [E]     SPOT NOISE
          [ESC]   END

        Please select [A] - [E] or [ESC]
```

Reference

Misoperation message

```
        CAN NOT FIND THE DATA FILE
        **** PRESS ANY KEY ****
```

To terminate the adjustment program (ZMAP):

Press the **Esc** key once to three times until the PC display returns from each menu screen to the MS-DOS screen. When the MS-DOS screen appears on PC display, turn off the video camera and jig.

6-2 List of Adjustment Items

6-2-1 List of adjustments needed after replacing major

The following table shows the adjustment items, their purposes, and whether or not check is required after replacing major components.
The components shown in the table below are the minimum to be checked after replacing major components: If several components have been replaced - or depending on the cause of a defect more components may need to be checked.

Table 6-2-1 List of adjustments needed after replacing major

●: CHECK

Items	Purpose Adjustment	Electrical Parts					Other
		IC1001	IC1101	IC1201	IC1202 (*1)	IC1351	Lens Block
Data Initialize							
Data Initilize **(*2)**	Initilizing EEPROM.				●		
Electric Volume							
CDS Sampling Pulse	To suppress noise in the CCD sensor output signal and maximize the signal level.		●		●		
Camera Adjustment (Adjustment)							
Auto Iris	To set the iris control data.	●		●	●	●	●
White Balance	To input the automatic white balance control data.	●			●		
Chroma Gain	To set the color satuation under the reference color temperrature.	●			●		
Auto Focus							
Zoom/Focus Tracking	To set the out-of -focus correction level during zooming.	●			●		●
AF Noise Level	To set the noise level in the autofocus circuit.	●			●		●
Check of Zoom/Focus Trace	To check the autofocus adjustment.	●			●		●
Spot Noise							
Spot Noise	To correct spot noise.	●			●		

*1: When replacing the EEPROM, be sure to perform all adjustments only after "Data Initialize".
*2: Since all adjustments must be performed any time "Data Initialize" is done, do not perform it indiscriminately.

6-2-2 Adjustment flowchart

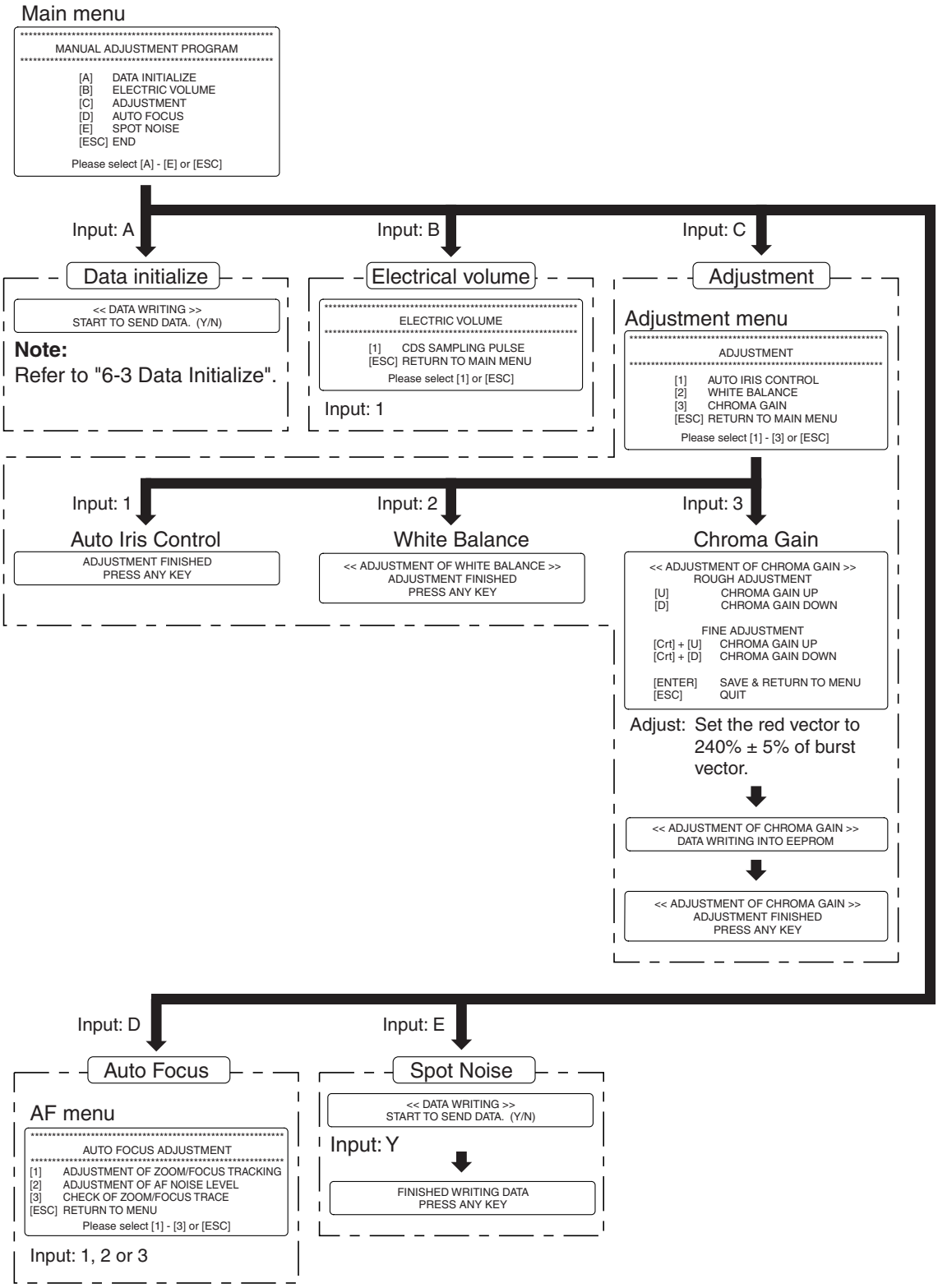


Fig. 6-2-1 Adjustment Flowchart

6-3 Data Initialize

Restriction:

1) This procedure initializes the adjustment data in EEPROM (including the adjustment data). Any time you replace the EEPROM, be sure to perform this procedure. Generally, this procedure is not necessary after replacing other components.
2) After completing this adjustment, be sure to perform all adjustment items as follows.

◆ Procedure

1) Input **A** to PC on the main menu screen.
2) The screen for verifying the initialization will appear: Input **Y** to PC. Entering N on the screen for verifying initialization will restore the data main menu screen.
3) Follow the instructions on PC display thereafter.

Main menu

```
**********************************************************
          MANUAL ADJUSTMENT PROGRAM
**********************************************************

          [A]    DATA INITIALIZE
          [B]    ELECTRIC VOLUME
          [C]    ADJUSTMENT
          [D]    AUTO FOCUS
          [E]    SPOT NOISE
          [ESC]  END

          Please select [A] - [E] or [ESC]
```

Input A. ⬇

Screen for verifying initialization

```
          << DATA WRITING >>
          START TO SEND DATA.  (Y/N)
```

Input Y. ⬇

Follow the instructions on PC display thereafter.

6-4 Electronic Volume

Input **B** to PC on the main menu screen to display the electronic volume menu screen. Pressing the Esc key on the adjustment menu screen will restore the main menu screen.

Main menu

```
**********************************************************
          MANUAL ADJUSTMENT PROGRAM
**********************************************************

          [A]    DATA INITIALIZE
          [B]    ELECTRIC VOLUME
          [C]    ADJUSTMENT
          [D]    AUTO FOCUS
          [E]    SPOT NOISE
          [ESC]  END

          Please select [A] - [E] or [ESC]
```

Input B. ⬇

Electronic volume menu

```
**********************************************************
                ELECTRIC VOLUME
**********************************************************

          [1]    CDS SAMPLING PULSE
          [ESC]  RETURN TO MAIN MENU

          Please select [1] or [ESC]
```

6-4-1 CDS sampling pulse adjustment

◆ Incompleted Phenomenon

Diagonal beats and horizontal noise occur.

◆ Condition:

Leave the video camera for more than 2 minutes until the circuits are stabilized after turning it on, then start adjustment.

◆ Procedure

1) Input **1** to PC on the adjustment menu screen.
2) Follow the instruction on PC display thereafter.

Electronic volume menu

```
**********************************************************
                    ELECTRIC VOLUME
**********************************************************
          [1]     CDS SAMPLING PULSE
          [ESC]   RETURN TO MAIN MENU
          Please select [1] or [ESC]
```

Input 1. ⬇

Follow the instructions on PC display thereafter.

6-5 Adjustment (Camera Adjustment)

Input **C** to PC on the main menu screen to display the adjustment menu screen and input to PC the appropriate adjustment number. Pressing the Esc key on the adjustment menu screen will restore the main menu screen.

Main menu

```
**********************************************************
                MANUAL ADJUSTMENT PROGRAM
**********************************************************
          [A]     DATA INITIALIZE
          [B]     ELECTRIC VOLUME
          [C]     ADJUSTMENT
          [D]     AUTO FOCUS
          [E]     SPOT NOISE
          [ESC]   END
          Please select [A] - [E] or [ESC]
```

Input C. ⬇

Adjustment menu

```
**********************************************************
                    ADJUSTMENT
**********************************************************
          [1]     AUTO IRIS CONTROL
          [2]     WHITE BALANCE
          [3]     CHROMA GAIN
          [ESC]   RETURN TO MAIN MENU
          Please select [1] - [3] or [ESC]
```

6-5-1 Auto iris control adjustment

◆ Incompleted Phenomenon

1) The picture becomes too bright.
2) The picture becomes too dark.

◆ Condition

Set point at the light box, without chart inserted, to fill the screen.

◆ Procedure

1) Input **1** to PC on the adjustment menu screen.
2) Follow the instruction on PC display thereafter.
3) After the AIC (auto iris control) adjustment complete screen appears, press any key to restore the adjustment menu screen.
4) Turn the video camera off, leave as is for at least 5 seconds, and then turn it on again. When the video camera is turned on again, the ZMAP may not operate normally, and the following adjustments may not be possible. If this happens, press the Esc key to restore the MS-DOS screen, and then restart the ZMAP.

Adjustment menu

```
**********************************************************
                    ADJUSTMENT
**********************************************************
        [1]     AUTO IRIS CONTROL
        [2]     WHITE BALANCE
        [3]     CHROMA GAIN
        [ESC]   RETURN TO MAIN MENU
        Please select [1] - [3] or [ESC]
```

Input 1. ⬇

Follow the instructions on PC display thereafter.

⬇

AIC adjustment complete

```
ADJUSTMENT FINISHED
PRESS ANY KEY
```

Press any key. ⬇

Turn the video camera off.

6-5-2 White balance adjustment

◆ Incompleted Phenomenon

1) Color of the subject is different from that of the picture.
2) A white subject is not seen as white.

◆ Equipment/Jig

C12 light balance filter

◆ Conditions

1) Attach a C12 light balance filter to lens.
2) Point at a gray scale chart.

◆ Procedure

1) Input **2** to PC on the adjustment menu screen.
2) Follow the instructions on PC display thereafter.
3) After the white balance adjustment complete screen appears, press any key to restore the adjustment menu screen.

Adjustment menu

```
**********************************************************
                    ADJUSTMENT
**********************************************************
        [1]     AUTO IRIS CONTROL
        [2]     WHITE BALANCE
        [3]     CHROMA GAIN
        [ESC]   RETURN TO MAIN MENU
        Please select [1] - [3] or [ESC]
```

Input 2. ⬇

Follow the instructions on PC display thereafter.

⬇

White balance adjustment complete

```
<< ADJUSTMENT OF WHITE BALANCE >>
ADJUSTMENT FINISHED
PRESS ANY KEY
```

Press any key. ⬇

Adjustment menu

6-5-3 Chroma gain adjustment (Figs. 6-5-1, 6-5-2, 6-5-3)

◆ Incompleted Phenomenon

1) Color of the picture is denser than that of the subject.
2) Color of the picture is lighter than that of the subject.

◆ Test Point

Video Out (PG1601-6)

◆ Equipment/Jig

1) Vectorscope or Oscilloscope
2) C12 light balance filter

◆ Condition

1) Attach a C12 light balance filter to lens.
2) Point at a color bar chart.

◆ Procedure

1) Input **3** to PC on the adjustment menu screen.
2) The chroma gain adjustment screen will appear.
3) When using a vectorscope (Figs. 6-5-1, 6-5-2):
   Press the **D** or **U** key to set the red vector to approx. 240% of burst vector. Then, while holding down the **Ctrl** key, press the **D** or **U** key to set the red vector to approx. 240% ± 5% of burst vector.
   When using an oscilloscope (Fig. 6-5-3):
   Press the **D** or **U** key to set the red level on waveform to approx. 686 mVp-p.
   Then, while holding down the **Ctrl** key, press the **D** or **U** key to set the red level on waveform to approx. 686 mV ± 20 mVp-p.
4) Press the **Enter** key: The PC display will switch from the chroma gain data write screen to chroma gain adjustment complete screen.
5) Press any key to restore the adjustment menu screen.

Adjustment menu

```
**********************************************************
                    ADJUSTMENT
**********************************************************
        [1]     AUTO IRIS CONTROL
        [2]     WHITE BALANCE
        [3]     CHROMA GAIN
        [ESC]   RETURN TO MAIN MENU
        Please select [1] - [3] or [ESC]
```

Input 3. ⬇

Chroma gain adjustment

```
<< ADJUSTMENT OF CHROMA GAIN >>
          ROUGH ADJUSTMENT
  [U]           CHROMA GAIN UP
  [D]           CHROMA GAIN DOWN

          FINE ADJUSTMENT
  [Crt] + [U]   CHROMA GAIN UP
  [Crt] + [D]   CHROMA GAIN DOWN

  [ENTER]       SAVE & RETURN TO MENU
  [ESC]         QUIT
```

Press the D or U, and Cont key to set the red vector to 240 % ± 5 % of burst vector, and press Enter key. ⬇

Chroma gain data write

```
<< ADJUSTMENT OF CHROMA GAIN >>
DATA WRITING INTO EEPROM
```

⬇

Chroma gain adjustment complete

```
<< ADJUSTMENT OF CHROMA GAIN >>
ADJUSTMENT FINISHED
PRESS ANY KEY
```

Press any key. ⬇

Adjustment menu

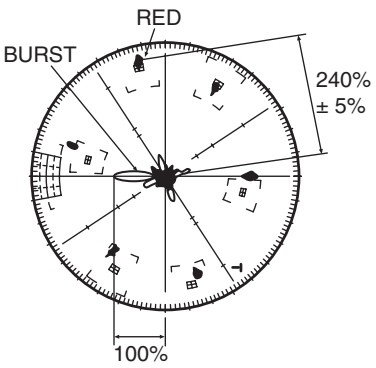


Fig. 6-5-1 Chroma Gain
(For VK-S214R)

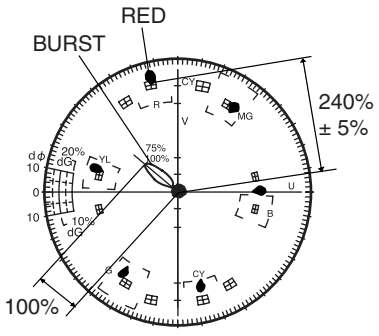


Fig. 6-5-2 Chroma Gain
(For VK-S214ER)

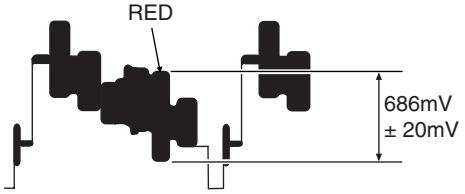


Fig. 6-5-3 Chroma Gain

6-6 Auto Focus

Input **D** to PC on the main menu screen to display the AF menu screen. Input the appropriate adjustment number to PC. Pressing the Esc key on the AF menu screen will restore the main menu screen.

Main menu

```
**********************************************************
          MANUAL ADJUSTMENT PROGRAM
**********************************************************

          [A]    DATA INITIALIZE
          [B]    ELECTRIC VOLUME
          [C]    ADJUSTMENT
          [D]    AUTO FOCUS
          [E]    SPOT NOISE
          [ESC]  END

          Please select [A] - [E] or [ESC]
```

Input D.

AF menu

```
**********************************************************
          AUTO FOCUS ADJUSTMENT
**********************************************************
[1]    ADJUSTMENT OF ZOOM/FOCUS TRACKING
[2]    ADJUSTMENT OF AF NOISE LEVEL
[3]    CHECK OF ZOOM/FOCUS TRACE
[ESC]  RETURN TO MENU
          Please select [1] - [3] or [ESC]
```

6-6-1 Zoom/focus tracking adjustment

◆ Incompleted Phenomenon

Focus is lost during zooming.

◆ Condition

1) Point at the backfocus chart, 1500 ± 5mm away from the lens surface.
2) Light the backfocus chart with 200 - 400 lx.

Note:

1) Measure the distance between the chart and lens surface precisely.
2) Place the chart as parallel as possible to the lens surface.
3) The backfocus chart should always be at the center of the monitor screen when the zoom is set to the wide-angle and telephoto ends.
4) The zoom trace adjustment procedure is completed within 2 minutes after it is selected.
5) Do not place any obstruction between the lens and chart during adjustment.

◆ Procedure

1) Input **1** to PC on the AF menu screen.
2) Follow the instructions on PC display thereafter.

AF menu

```
**********************************************************
          AUTO FOCUS ADJUSTMENT
**********************************************************
[1]    ADJUSTMENT OF ZOOM/FOCUS TRACKING
[2]    ADJUSTMENT OF AF NOISE LEVEL
[3]    CHECK OF ZOOM/FOCUS TRACE
[ESC]  RETURN TO MENU
          Please select [1] - [3] or [ESC]
```

Input 1.

Follow the instructions on PC display thereafter.

6-6-2 AF noise level adjustment

◆ Incompleted Phenomenon

1) It takes time until a subject is brought into focus.
2) Correct focus is not obtained.

◆ Condition

Point at a light box without a chart inserted at a distance of up to 10cm.

Note:
1) Place the light box as parallel as possible to the lens surface.
2) The AF noise level adjustment procedure will be completed within thirty seconds after it is selected.

◆ Procedure

1) Input **2** to PC on the AF menu screen.
2) Follow the instructions on PC display thereafter.

AF menu

```
**********************************************************
          AUTO FOCUS ADJUSTMENT
**********************************************************
[1]    ADJUSTMENT OF ZOOM/FOCUS TRACKING
[2]    ADJUSTMENT OF AF NOISE LEVEL
[3]    CHECK OF ZOOM/FOCUS TRACE
[ESC]  RETURN TO MENU
          Please select [1] - [3] or [ESC]
```

Input 2.

Follow the instructions on PC display thereafter.

6-6-3 Check of zoom/focus trace

◆ Incompleted Phenomenon

Focus is lost during zooming.

◆ Condition

1) Point at the backfocus chart, 1500 ± 5mm away from the lens surface.
2) Light the backfocus chart with 200 - 400 lx.

Note:
1) Measure the distance between the chart and lens surface precisely.
2) Place the chart as parallel as possible to the lens surface.
3) The backfocus chart should always be at the center of the monitor screen when the zoom is set to the wide-angle and telephoto ends.
4) Do not place any obstruction between the lens and chart during adjustment.

◆ Procedure

1) Input **3** to PC on the AF menu screen.
2) Follow the instructions on PC display thereafter.
   If error message appears, readjust the following items:
   6-6-1 Zoom/focus tracking adjustment
   6-6-2 AF noise level adjustment

AF menu

```
**********************************************************
          AUTO FOCUS ADJUSTMENT
**********************************************************
[1]    ADJUSTMENT OF ZOOM/FOCUS TRACKING
[2]    ADJUSTMENT OF AF NOISE LEVEL
[3]    CHECK OF ZOOM/FOCUS TRACE
[ESC]  RETURN TO MENU
          Please select [1] - [3] or [ESC]
```

Input 3.

Follow the instructions on PC display thereafter.

6-7 Spot Noise

Spot noise refers to bright points that appear on the screen, which are caused by a defect in pixel of image sensor.

Note:
1) Perform this adjustment after specified components have been replaced (see "6-2-1 List of Adjustments Needed After Replacing Major ").
2) Perform this adjustment if spot noise occurs under abnormal usage conditions or after long-term use.
3) Perform this adjustment after completing all other adjustments. Perform this adjustment in normal video status.

◆ Incompleted Phenomenon

Spot noise occurs under abnormal usage conditions or after long-term use.

◆ Equipment/Jig

Color video monitor (CRT type is desirable)

◆ Condition

Cap the lens (so that no light enters).

◆ Procedure

1) Input **E** to PC on the main menu screen.
2) Follow the instructions on PC display thereafter.
3) The screen for verifying writing of spot noise data will appear: Input **Y**. Entering N on the screen for verifying writing of spot noise data will restore the main menu screen.
4) When writing data is complete, the spot noise data write complete screen will appear: Press any key to restore the main menu screen.

Note:
If spot noise still occurs after this adjustment is complete, the image sensor may be defective.

Main menu

```
**********************************************************
          MANUAL ADJUSTMENT PROGRAM
**********************************************************

          [A]    DATA INITIALIZE
          [B]    ELECTRIC VOLUME
          [C]    ADJUSTMENT
          [D]    AUTO FOCUS
          [E]    SPOT NOISE
          [ESC]  END

          Please select [A] - [E] or [ESC]
```

Input E. ⬇

Follow the instructions on PC display thereafter.

⬇

Screen for verifying writing of spot noise data

```
<< DATA WRITING >>
START TO SEND DATA.  (Y/N)
```

Input Y. ⬇

Spot noise data write complete

```
FINISHED WRITING DATA
PRESS ANY KEY
```

Press any key. ⬇

Adjustment menu

6-8 Error Messages and Countermeasure

A message may appear while you are adjusting the video camera. If a message appears, refer to the following table and take appropriate corrective action.

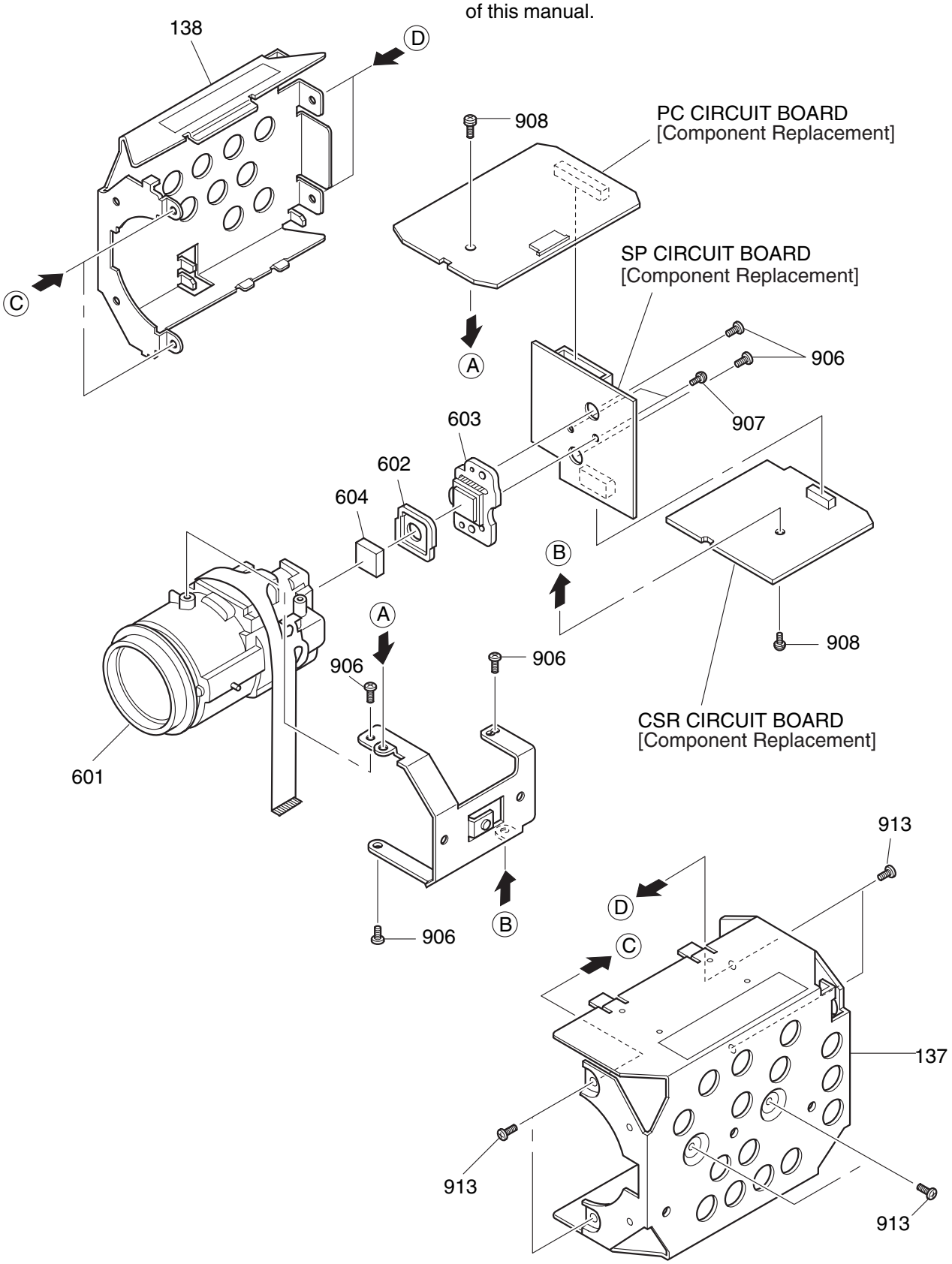
Error Messages	Countermeasure
When adjusting the electric volume and adjustment	
CAN'T ADJUST WHITE BALANCE PLEASE RETRY PRESS ANY KEY	1) The subject is too bright or too dark. 2) Check the light box. 3) Move the camera closer to or away from the light box. 4) Supply power again and readjust.
D RANGE OVER. ERROR ON da× ADJUSTMENT PRESS ANY KEY. (×: Error code)	1) Check the values in the hall amp circuit. 2) Defective soldering, damage to pattern, etc. in the above circuit.
D RANGE OVER ERROR ON HALL AMP IRIS CANNOT OPEN ANY MORE PRESS ANY KEY	1) Supply power again and readjust. 2) The subject is too dark. 3) Check the light box. 4) Move the camera closer to the light box. 5) Check the values in the hall amp circuit. 6) Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED. IRIS TROUBLE PRESS ANY KEY	1) Check whether or not power is supplied. 2) Check the values of the iris drive circuit. 3) Defective soldering, damage to pattern, etc. in the above circuit. 4) Check the iris block and replace it if necessary.
ERROR OCCURRED ON da× ADJUSTMENT PRESS ANY KEY	1) Check the values in the hall amp circuit. 2) Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED ON da0 and da1 ADJUSTMENT PRESS ANY KEY	1) Check the values in the hall amp circuit and its peripheral circuits. 2) Defective soldering, damage to pattern, etc. in the above circuits.
FILE NOT FOUND !!!! PRESS ANY KEY	1) The adjustment program (file) cannot be found. 2) Check the adjustment floppy disk and replace it if necessary.
FILE OPEN ERROR !!!! PRESS ANY KEY	1) The adjustment program (file) does not start. 2) Check the adjustment floppy disk and replace it if necessary.
ERROR OCCURRED ON C DUTY ADJUSTMENT PRESS ANY KEY	1) Check the values of the iris drive circuit. 2) Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED ON FDET ADJUSTMENT PRESS ANY KEY	1) Supply power again and readjust. 2) Check the values in the hall amp circuit. 3) Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED. ZOOM DOES NOT WORK PRESS ANY KEY	1) Supply power again and readjust.
STAURATION ERROR. TOO BRIGHT PRESS ANY KEY	1) The subject is too bright. 2) Move the camera further away from the light box.

Error Messages	Countermeasure
TOO BRIGHT PRESS ANY KEY	1) The subject is too bright. 2) Move the camera further away from the light box.
TOO DARK PRESS ANY KEY	1) The subject is too dark. 2) Check the light box. 3) Move the camera closer to the light box.
When adjusting the auto focus	
AF ERROR	1) If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. 2) Refer to "(4) No zoom and focus operation" on "4-1-2 Trouble Diagnosis Flowchart".
AF LIMIT OVER	1) Check the conditions of subject. 2) If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. 3) Refer to "(6) No focus lens operation" on "4-1-2 Trouble Diagnosis Flowchart".
TIME OUT ERROR ON AF STEP	1) Check the conditions of subject. 2) If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. 3) Refer to "(4) No zoom and focus operation" on "4-1-2 Trouble Diagnosis Flowchart".
TIME OUT ERROR ON FOCUS	
TIME OUT ERROR ON ZOOM	1) If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. 2) Refer to "(7) No zoom operation" on "4-1-2 Trouble Diagnosis Flowchart".
TOO DARK	1) Insufficient lighting. Check the subject.
TRACE ERROR. ADJUST ZOOM TRACE & AF NOISE AGAIN	1) Supply power again and readjust.
When adjusting the spot noise	
ERROR!! SPOT NOISE COMPENSATION IS STOPPED BY INITIAL DATA. PLEASE CHECK THE EEPROM. PRESS ANY KEY.	1) Spot noise compensation is inhibited by the data in the EEPROM. 2) Turn the power on again. 3) Data in the EEPROM is defective. (data Initialize it.) 4) Check the EEPROM, and if necessary, replace it.
ERROR!! THE SPOT NOISE IS TOO MANY. CAN'T COMPENSATE ANY MORE. PRESS ANY KEY.	1) The amount of spot noise that can be compensated reaches the limit. 2) Turn the power on again. 3) Check the image sensor, and if necessary, replace it.
ERROR!! THRESHOLD DATA ERROR. PLEASE CHECK THE EEPROM. PRESS ANY KEY.	1) Turn the power on again. 2) Data in the EEPROM is defective. (data Initialize it.) 3) Check the EEPROM, and if necessary, replace it.

7 Exploded View and Parts List

7-1 Exploded View

Note: Components without any numbers in exploded views had not been assigned as service parts as of the date of issue of this manual.



7-2 Replacement Parts List

7-2-1 Mechanical Parts List

SYMBOL NO	P-NO	DESCRIPTION
		MECHANISM SECTION
137	NA31542	CHASSISE,L
138	NA31552	CHASSISE,R
601	KQ10752	LENS ASSY
602	NX11252	RUBBER
603	UE15891	SENSOR ASSY [VK-S214R]
603	UE15892	SENSOR ASSY [VK-S214ER]
604	DT10251	TUBE,CAMERA
906	7775945	SCREW(2X5)
907	8650103	SCREW(2X3)
908	MK11051	SCREW(2X5)
913	MK13481	SCREW(M2X3DT)

7-2-2 Electrical Parts List

SYMBOL NO	P-NO	DESCRIPTION
		CAPACITORS
C1001	0893107	CERAMIC CHIP 5PF+-0.25% 50V
C1002	AA00335R	CHIP CERAMIC 1.0UF+80-20% 25V
C1003	AA00335R	CHIP CERAMIC 1.0UF+80-20% 25V
C1004	AA00422R	CERAMIC CHIP 10UF 16V
C1005	AA00422R	CERAMIC CHIP 10UF 16V
C1006	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1007	0893211	CERAMIC CHIP 1500PF+-10% 50V
C1008	AA00393R	CHIP CERAMIC 1.0UF+80-20% 50V
C1009	AA00393R	CHIP CERAMIC 1.0UF+80-20% 50V
C1010	AA00931R	CERAMIC CAPACITOR 1.0UF+-10% 10V
C1011	AA00931R	CERAMIC CAPACITOR 1.0UF+-10% 10V
C1012	0893222	CERAMIC CHIP 0.01UF+-10% 50V
C1013	AA00335R	CHIP CERAMIC 1.0UF+80-20% 25V
C1101	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1102	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1103	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1104	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1105	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1106	AA00441R	CHIP CAPACITOR 22UF+-20% 6.3V
C1107	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1108	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1109	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1110	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1111	AA00951R	CERAMIC CAPACITOR 1.0UF+-10% 16V
C1112	AA01111R	CERAMIC CHIP 1UF 6.3V
C1113	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1114	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1115	0893119	CERAMIC CHIP 33PF+-5% 50V
C1116	AA00441R	CHIP CAPACITOR 22UF+-20% 6.3V
C1118	AA00442R	CERAMIC CAPACITOR 10UF 6.3V
C1121	AA00441R	CHIP CAPACITOR 22UF+-20% 6.3V
C1122	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1123	AA01111R	CERAMIC CHIP 1UF 6.3V
C1124	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1125	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1126	0893126	CERAMIC CHIP 100PF+-5% 50V
C1128	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1130	0893119	CERAMIC CHIP 33PF+-5% 50V
C1131	0893119	CERAMIC CHIP 33PF+-5% 50V
C1132	0893117	CERAMIC CHIP 22PF+-5% 50V
C1133	AA00381R	CERAMIC CHIP 10UF+-10% 6.3V
C1134	AA00381R	CERAMIC CHIP 10UF+-10% 6.3V
C1135	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1136	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1137	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1138	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1141	AA00412R	CERAMIC CHIP 10UF+-80-20% 16V
C1142	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1145	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1146	AA01111R	CERAMIC CHIP 1UF 6.3V
C1147	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1148	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1149	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1151	0893123	CERAMIC CHIP 56PF+-5% 50V
C1160	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1162	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1170	0893103	CHIP CAPACITOR 1.5PF 50V
C1171	0893175	CERAMIC CHIP 1000PF+-5% 50V
C1173	0893115	CERAMIC CHIP 15PF+-5% 50V
C1174	0893115	CERAMIC CHIP 15PF+-5% 50V
C1175	0893102	CERAMIC CHIP 1.0PF+-0.25% 50V
C1176	0893175	CERAMIC CHIP 1000PF+-5% 50V

SYMBOL NO	P-NO	DESCRIPTION
C1177	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1178	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1179	0893123	CERAMIC CHIP 56PF+-5% 50V
C1180	0893123	CERAMIC CHIP 56PF+-5% 50V
C1182	0893107	CERAMIC CHIP 5PF+-0.25% 50V
C1184	0893101	CERAMIC CHIP 0.5PF+-0.25% 50V
C1185	0893113	CERAMIC CHIP 10PF+-0.5% 50V
C1186	0893113	CERAMIC CHIP 10PF+-0.5% 50V
C1187	0893101	CERAMIC CHIP 0.5PF+-0.25% 50V
C1188	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1189	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1190	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1191	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1192	0893104	CERAMIC CHIP 2.0PF 50V
C1193	0893102	CERAMIC CHIP 1.0PF+-0.25% 50V
C1201	AA00442R	CERAMIC CAPACITOR 10UF 6.3V
C1202	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1203	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1204	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1205	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1206	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1207	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1208	AA00442R	CERAMIC CAPACITOR 10UF 6.3V
C1215	0893177	CAPACITOR 0.068UF+-10% 16V
C1217	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1218	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1227	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1301	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C1302	0893215	CERAMIC CHIP 3300PF+-10% 50V
C1303	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1304	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C1305	0893215	CERAMIC CHIP 3300PF+-10% 50V
C1306	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1311	AA00422R	CERAMIC CHIP 10UF 16V
C1314	AA00381R	CERAMIC CHIP 10UF+-10% 6.3V
C1351	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1352	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1353	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1354	0893132	CERAMIC CHIP 270PF+-5% 50V
C1355	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1356	0893007	CERAMIC CHIP 0.082UF+-10% 16V
C1357	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C1358	0893113	CERAMIC CHIP 10PF+-0.5% 50V
C1359	0893133	CERAMIC CHIP 330PF+-5% 50V
C1360	0893133	CERAMIC CHIP 330PF+-5% 50V
C1361	0893133	CERAMIC CHIP 330PF+-5% 50V
C1362	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1388	AA00422R	CERAMIC CHIP 10UF 16V
C1501	0893202	CERAMIC CHIP 330PF+-10% 50V
C1502	0893165	CERAMIC CHIP 180PF+-5% 50V
C1503	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1504	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1506	0209942	CERAMIC CHIP 100PF+-5% 50V
C1507	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C1508	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1509	AA00422R	CERAMIC CHIP 10UF 16V
C1511	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1513	0893202	CERAMIC CHIP 330PF+-10% 50V
C1514	0893165	CERAMIC CHIP 180PF+-5% 50V
C1516	0893158	CERAMIC CHIP 56PF+-5% 50V
C1517	0893203	CERAMIC CHIP 390PF+-10% 50V
C1518	0893202	CERAMIC CHIP 330PF+-10% 50V
C1519	0893165	CERAMIC CHIP 180PF+-5% 50V
C1522	AA00422R	CERAMIC CHIP 10UF 16V
C1523	AA00422R	CERAMIC CHIP 10UF 16V
C1524	AA00422R	CERAMIC CHIP 10UF 16V
C1525	AA01001R	CHIP CAPACITOR 1.0UF 25V
C1527	AA00422R	CERAMIC CHIP 10UF 16V
C1528	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1530	AA01001R	CHIP CAPACITOR 1.0UF 25V
C1532	AA00751R	CERAMIC CHIP 10UF+-10% 6.3V
C1533	AA00441R	CHIP CAPACITOR 22UF+-20% 6.3V
C1534	AA01001R	CHIP CAPACITOR 1.0UF 25V
C1535	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1536	AA00751R	CERAMIC CHIP 10UF+-10% 6.3V
C1537	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1538	AA01001R	CHIP CAPACITOR 1.0UF 25V
C1539	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1540	AA00335R	CHIP CERAMIC 1.0UF+80-20% 25V
C1541	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1542	AA00335R	CHIP CERAMIC 1.0UF+80-20% 25V
C1543	AA00807R	CHIP CAPACITOR 10UF+-20% 25V
C1544	AA00807R	CHIP CAPACITOR 10UF+-20% 25V
C1601	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1602	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1603	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1604	AA00931R	CERAMIC CAPACITOR 1.0UF+-10% 10V
C1605	0893011	CERAMIC CHIP 0.15UF+-10% 16V
C1606	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1607	0893117	CERAMIC CHIP 22PF+-5% 50V [VK-S214R]
C1607	0893114	CERAMIC CHIP 12PF+-5% 50V [VK-S214ER]
C1641	AD10252R	ELECTROLYTIC 1.0UF 20V
C1642	0893179	CERAMIC CHIP 0.1UF+-10% 16V
C1643	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1644	AA00931R	CERAMIC CAPACITOR 1.0UF+-10% 10V
C1648	0806129	ELECTROLYTIC 22UF 10V
C1649	AD10273R	CHIP RESISTOR 100UF+-20% 6.3V
C1651	AA00968R	CERAMIC CAPACITOR 10UF+-20% 6.3V
C1652	AA00422R	CERAMIC CHIP 10UF 16V
C1653	0893225	CERAMIC CHIP 0.1UF+80-20% 16V

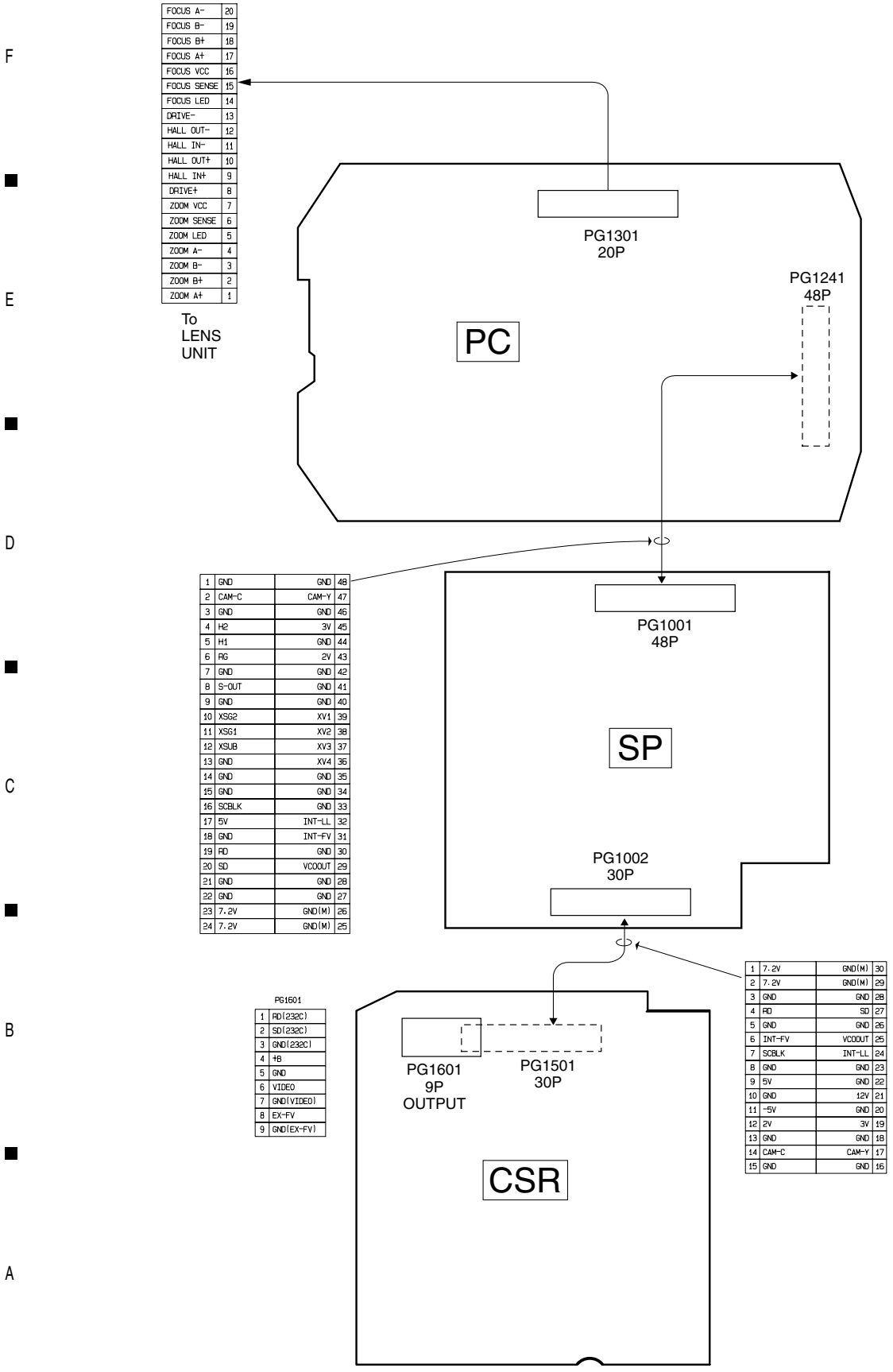
RESISTORS

R1001	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R1002	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R1004	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1005	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1101	AQ00231R	CHIP RESISTOR 24KOHM+-1% 1/16W
R1102	0790001	JUMPER CHIP RESISTOR
R1108	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1109	0790025	CHIP RESISTOR 120 OHM+-5% 1/16W
R1110	0790025	CHIP RESISTOR 120 OHM+-5% 1/16W
R1113	0790011	CHIP RESISTOR 10 OHM+-5% 1/16W
R1121	AQ00215R	CHIP RESISTOR 6.2KOHM+-1% 1/10W
R1122	AQ00234R	CHIP RESISTOR 33KOHM+-1% 1/16W
R1126	AQ00218R	CHIP RESISTOR 8.2KOHM+-1% 1/16W
R1127	AQ00244R	CHIP RESISTOR 75KOHM+-1% 1/16W
R1129	0103882	JUMPER CHIP RESISTOR
R1130	0103882	JUMPER CHIP RESISTOR
R1151	0790001	JUMPER CHIP RESISTOR
R1153	AQ00176R	CHIP RESISTOR 220 OHM+-1% 1/16W [VK-S214R]
R1153	0790001	JUMPER CHIP RESISTOR [VK-S214ER]
R1155	AQ00198R	CHIP RESISTOR 1.5KOHM+-1% 1/16W
R1156	AQ00212R	CHIP RESISTOR 4.7KOHM+-1% 1/16W
R1157	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1158	AQ00232R	CHIP RESISTOR 27KOHM+-1% 1/16W
R1159	AQ00187R	CHIP RESISTOR 560OHM+-1% 0.063W
R1162	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1164	AQ00205R	CHIP RESISTOR 2.7KOHM+-1% 1/16W
R1165	AQ00194R	CHIP RESISTOR 1.0KOHM+-1% 1/16W

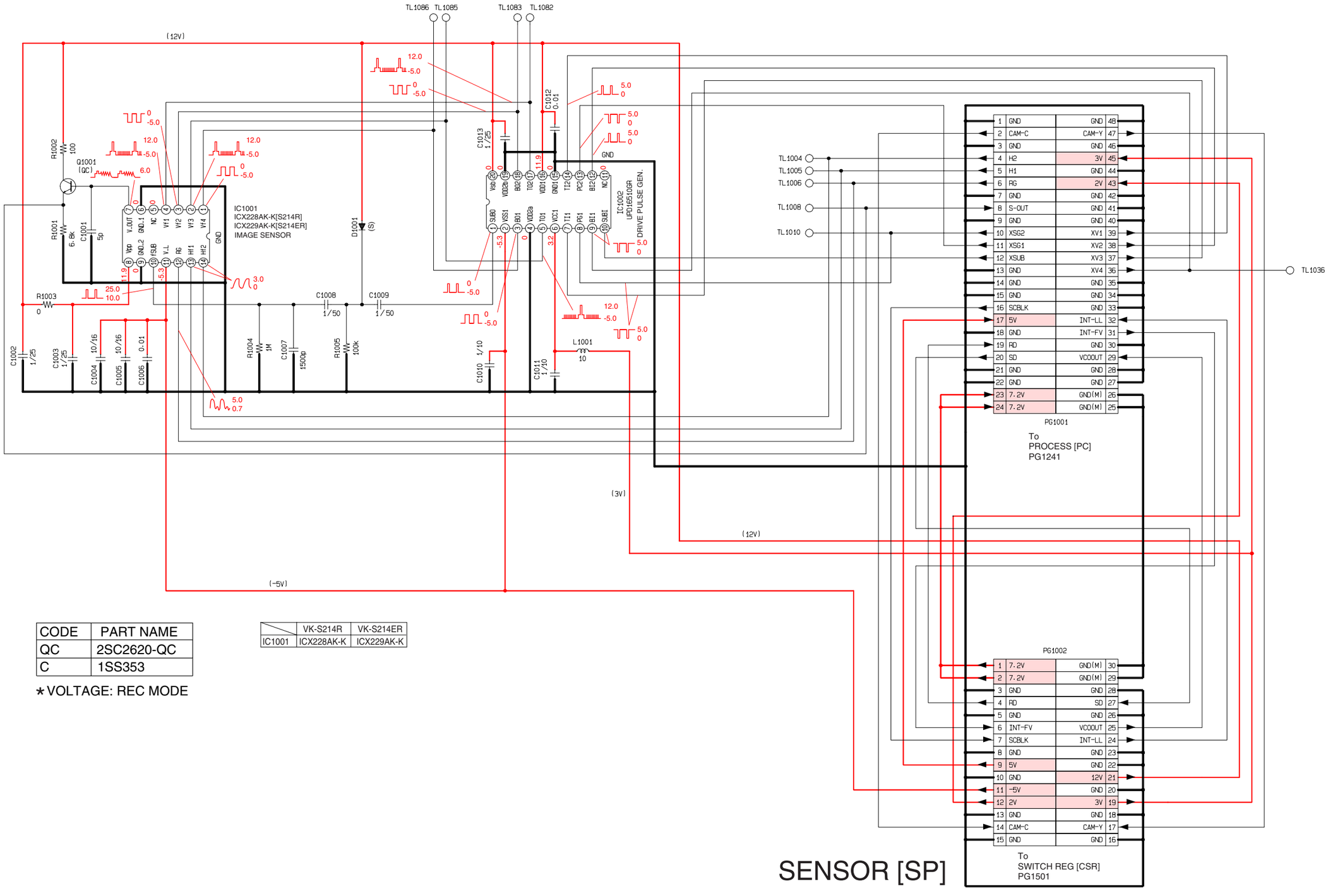
SYMBOL NO	P-NO	DESCRIPTION
R1171	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1172	0790035	CHIP RESISTOR 680 OHM+-5% 1/16W
R1173	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1175	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1176	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1177	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1178	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1179	AQ00189R	CHIP RESISTOR 680 OHM+-1% 0.063W
R1180	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1181	0790001	JUMPER CHIP RESISTOR
R1182	0790001	JUMPER CHIP RESISTOR
R1201	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1202	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1203	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1205	AQ00223R	CHIP RESISTOR 12KOHM+-1% 1/16W
R1206	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1208	0790068	CHIP RESISTOR 220KOHM+-5% 1/16W
R1209	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1210	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1211	0790072	CHIP RESISTOR 390KOHM+-5% 1/16W
R1214	0790027	CHIP RESISTOR 180OHM+-5% 1/16W
R1215	0790027	CHIP RESISTOR 180OHM+-5% 1/16W
R1216	0790061	CHIP RESISTOR 56KOHM+-5% 1/16W
R1217	0790061	CHIP RESISTOR 56KOHM+-5% 1/16W
R1218	0790001	JUMPER CHIP RESISTOR
R1220	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1221	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1222	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1223	0790001	JUMPER CHIP RESISTOR
R1224	0790001	JUMPER CHIP RESISTOR
R1225	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1226	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1231	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1241	AQ00189R	CHIP RESISTOR 680 OHM+-1% 0.063W
R1242	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1257	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1259	0790001	JUMPER CHIP RESISTOR
R1301	0105574	CHIP RESISTOR 4.7 OHM+-1% 1/10W
R1302	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1303	0105574	CHIP RESISTOR 4.7 OHM+-1% 1/10W
R1304	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1305	0105574	CHIP RESISTOR 4.7 OHM+-1% 1/10W
R1306	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1307	0105574	CHIP RESISTOR 4.7 OHM+-1% 1/10W
R1308	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1351	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R1352	0790069	CHIP RESISTOR 0.27MOHM+-5% 1/16W
R1353	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1354	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1355	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1356	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1357	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1358	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R1359	0790067	CHIP RESISTOR 180KOHM+-5% 1/16W
R1360	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1361	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R1362	0790067	CHIP RESISTOR 180KOHM+-5% 1/16W
R1363	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1364	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1365	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1366	0790054	CHIP RESISTOR 18KOHM+-5% 1/16W
R1367	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1368	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1369	0790001	JUMPER CHIP RESISTOR
R1370	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R1371	0790029	CHIP RESISTOR 270 OHM+-5% 1/16W
R1372	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1374	0790049	CHIP RESISTOR 8.2KOHM+-5% 1/16W
R1375	0790036	CHIP RESISTOR 820 OHM+-5% 1/16W
R1376	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1378	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1501	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1503	0790001	JUMPER CHIP RESISTOR
R1504	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R1506	0790001	JUMPER CHIP RESISTOR
R1508	AQ00231R	CHIP RESISTOR 24KOHM+-1% 1/16W
R1509	0790001	JUMPER CHIP RESISTOR
R1511	AQ00212R	CHIP RESISTOR 4.7KOHM+-1% 1/16W
R1512	0790001	JUMPER CHIP RESISTOR
R1513	0790041	CHIP RESISTOR 1.8KOHM+-5% 1/16W
R1514	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R1515	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1516	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1517	0790049	CHIP RESISTOR 8.2KOHM+-5% 1/16W
R1518	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1519	AQ00247R	CHIP RESISTOR 100KOHM+-1% 1/16W
R1520	AQ01015R	CHIP RESISTOR 3.9KOHM+-0.5% 1/16W
R1521	AQ01012R	CHIP RESISTOR 2.2KOHM+-0.5% 1/16W
R1524	AQ01021R	CHIP RESISTOR 10KOHM+-0.5% 1/16W
R1525	AQ01007R	CHIP RESISTOR 1KOHM+-0.5% 1/16W
R1526	AQ01016R	CHIP RESISTOR 4.7KOHM+-0.5% 1/16W
R1527	AQ00223R	CHIP RESISTOR 12KOHM+-1% 1/16W
R1528	AQ00254R	CHIP RESISTOR 180KOHM+-1% 1/16W
R1530	AQ01021R	CHIP RESISTOR 10KOHM+-0.5% 1/16W
R1533	AQ01014R	CHIP RESISTOR 3.3KOHM +-0.5% 1/16W
R1534	AQ01021R	CHIP RESISTOR 10KOHM+-0.5% 1/16W
R1537	AQ01028R	CHIP RESISTOR 39KOHM 1/16W
R1538	AQ01026R	CHIP RESISTOR 27KOHM+-0.5% 1/16W
R1539	0105205	CHIP RESISTOR 510 OHM+-0.5% 1/16W
R1540	0105194	CHIP RESISTOR 2400OHM+-0.5% 1/16W
R1545	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1546	AQ00998R	CHIP RESISTOR 220 OHM+-0.5% 1/16W
R1547	0790048	CHIP RESISTOR 6.8KOHM+-5% 1/16W
R1601	0790073	CHIP RESISTOR 470KOHM+-5% 1/16W
R1605	0104153	CHIP RESISTOR 470 OHM+-10% 0.125W
R1606	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1607	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R1608	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1610	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R1611	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1612	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1613	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R1614	0790042	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R1615	0790001	JUMPER CHIP RESISTOR
R1616	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1617	0790065	CHIP RESISTOR 120KOHM+-5% 1/16W
R1619	0790001	JUMPER CHIP RESISTOR
R1621	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1622	0790073	CHIP RESISTOR 470KOHM+-5% 1/16W
R1623	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1627	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1628	AQ00203R	CHIP RESISTOR 2.2KOHM+-1% 1/16W
R1629	AQ00205R	CHIP RESISTOR 2.7KOHM+-1% 1/16W
R1636	0103829	CHIP RESISTOR 68OHM+-5% 0.1W
R1650	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1651	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1652	AQ00194R	CHIP RESISTOR 1.0KOHM+-1% 1/16W
R1653	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W

SYMBOL NO	P-NO	DESCRIPTION
		SEMI-CONDUCTORS
D1001	CC10291R	DIODE 1SS353
D1151	5337352	DIODE MA132WA
D1171	5337471	DIODE KV1470
D1201	5337422	DIODE DA221
D1351	5337422	DIODE DA221
D1502	5337372	DIODE SB07-03C
D1503	5337372	DIODE SB07-03C
D1504	5337372	DIODE SB07-03C
D1505	CC10291R	DIODE 1SS353
D1506	CC10291R	DIODE 1SS353
D1507	5337391	DIODE D1FS4
D1510	5337354	DIODE MA133
D1511	5337354	DIODE MA133
D1514	5337352	DIODE MA132WA
IC1002	CK12061R	IC UPD16510GR
IC1101	CK21332U	IC HD49323AF
IC1121	CK20631U	IC HG73C012TE
IC1173	CK15051R	IC TC7SU04FU
IC1174	CK18421R	IC TC7SHU04FU
IC1175	CK27241R	IC SN74VLC00APW
IC1176	CK18421R	IC TC7SHU04FU
IC1201	CK43811U	IC HD6432237M15TE
IC1202	CK28301R	IC BR9016RFV
IC1251	CK20403R	IC RN5VD27AA
IC1301	CK40401R	IC TB6512AF
IC1302	CK40401R	IC TB6512AF
IC1351	CK20621R	IC UPD5023GS-147-GJG
IC1501	1366251	IC TL1464IPT
IC1502	CK20191R	IC PQ20WZ51
IC1601	CK26651R	IC BA7665FS
IC1602	1366081	IC HD74HCT125T
IC1603	CK23291R	IC 74VHC4046MTCX
IC1604	5305831	IC TC7S08
Q1001	5328221	TRANSISTOR 2SC2620-QC
Q1151	5328192	TRANSISTOR 2SC2462LD
Q1152	1323231	TRANSISTOR 2SB1462
Q1153	1323231	TRANSISTOR 2SB1462
Q1201	1323286	TRANSISTOR UMH9N
Q1351	5328192	TRANSISTOR 2SC2462LD
Q1352	5328974	TRANSISTOR 2SC2412K
Q1353	1323142	TRANSISTOR 2SC2411K
Q1502	CA10271R	TRANSISTOR 2SB1424
Q1503	CA10271R	TRANSISTOR 2SB1424
Q1504	CA10271R	TRANSISTOR 2SB1424
Q1505	CA10951R	TRANSISTOR 2SA1797
Q1506	5326422	TRANSISTOR 2SC4081
Q1601	1323273	TRANSISTOR DTA143EE
Q1602	1323271	TRANSISTOR DTC144EE
Q1603	1323279	TRANSISTOR DTC114YE
Q1605	1323231	TRANSISTOR 2SB1462
Q1607	5328221	TRANSISTOR 2SC2620-QC
Q1608	1323253	TRANSISTOR XP4401
Q1610	1323291	TRANSISTOR 2SC4617
Q1611	1323231	TRANSISTOR 2SB1462
ZD1171	CC10433R	DIODE(MA3030L)
		COILS
CP1171	BE10591R	COIL
CP1601	BV10201R	CHOKE COIL
T1501	BC10441R	COIL
L1001	BA10577R	COIL 10UH
L1101	BA10577R	COIL 10UH
L1102	BA10577R	COIL 10UH
L1141	BA10577R	COIL 10UH
L1171	BA10577R	COIL 10UH
L1201	BA10577R	COIL 10UH
L1202	BA10577R	COIL 10UH
L1301	BA11233R	COIL
L1302	BA10577R	COIL 10UH
L1502	BA11236R	COIL
L1503	BA11233R	COIL
L1504	BA11236R	COIL
L1505	0773004	COIL 100UH
L1506	0773004	COIL 100UH
L1507	BA10579R	COIL 22UH
L1601	BA10577R	COIL 10UH
L1602	BA10577R	COIL 10UH
L1603	BA10584R	COIL 100UH
		CRYSTALS
X1171	BL11096R	CRYSTAL [VK-S214R]
X1171	BL11097R	CRYSTAL [VK-S214ER]
X1172	BL11098R	CRYSTAL
X1241	BL11111R	CRYSTAL
		MISCELLANEOUS
BL1121	BM00137R	FILTER
BL1122	BM00137R	FILTER
BL1601	BE10132R	FILTER,LC
⚠ F1601	5723235	FUSE 1A
PG1001	1830315	CONNECTOR
PG1002	1830307	PLUG
PG1241	1830316	CONNECTOR
PG1301	EA10407R	CONNECTOR
PG1501	1830301	PLUG
PG1601	5666914	MINI PLUG

1 Wiring Diagram



2 Schematic Diagrams
2-1 Sensor [SP] Schematic Diagram

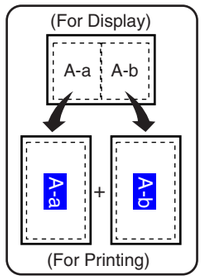


CODE	PART NAME
QC	2SC2620-QC
C	1SS353

	VK-S214R	VK-S214ER
IC1001	ICX228AK-K	ICX229AK-K

*VOLTAGE: REC MODE

2-2 Process [PC] Schematic Diagram (For Display)



CODE	PART NAME
AR	2SB1462
BR	2SC2412K
CQ	2SC2411K
E2	TC7S08FU
E6	TC7SU04FU
LD	2SC2462-LD-T
HA	TC7SH14FU
H6	TC4SHU04FU
H9	UMH9N
F7	KV1470
K	DA221
MO	MA132WA
3.0L	MA3030

*VOLTAGE: REC MODE

PROCESS [PC]

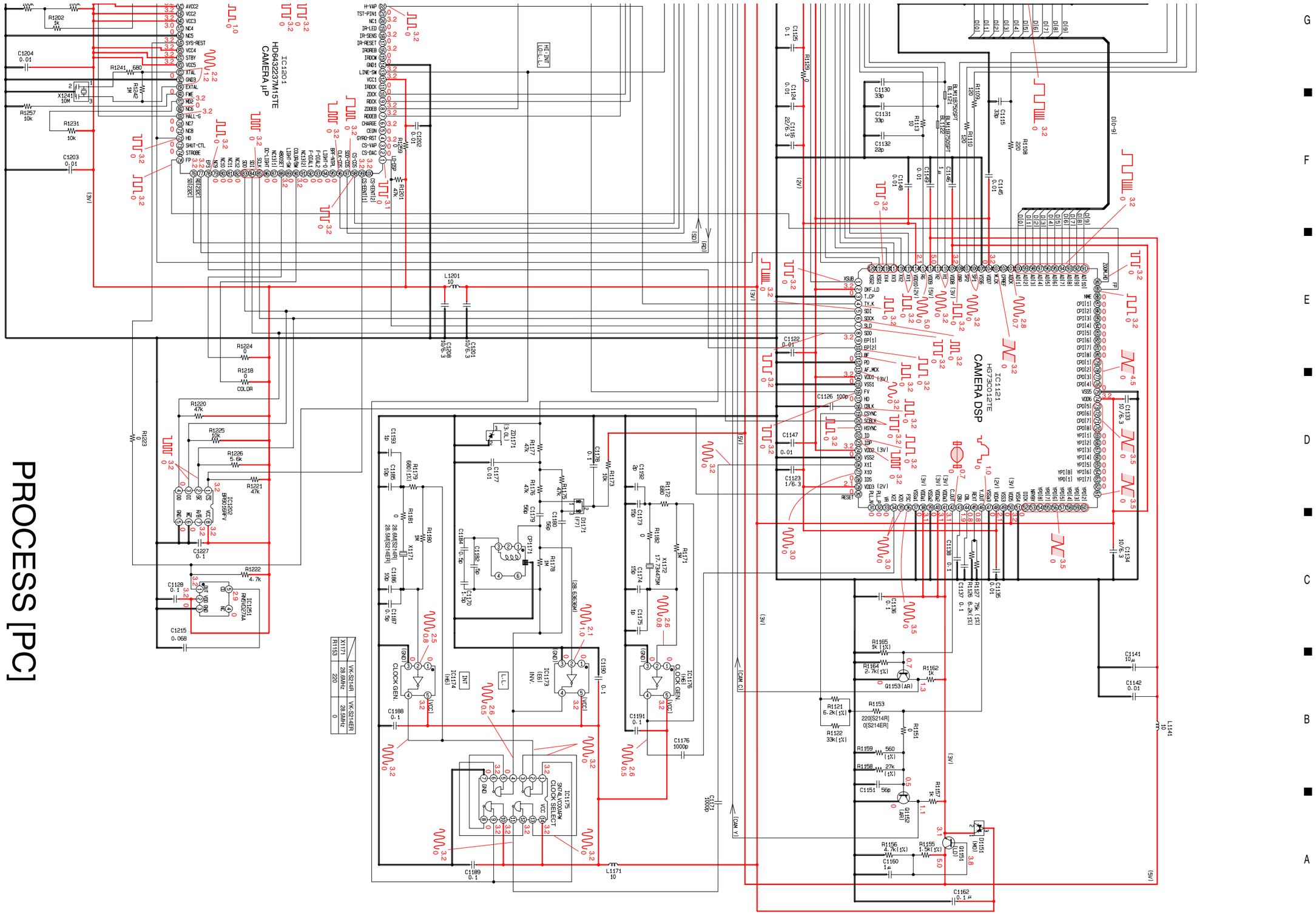
2-3 Process [PC] Schematic Diagram (For Printing) A-a

CODE	PART NAME
AR	2SB1462
BR	2SC2412K
CQ	2SC2411K
E2	TC7S08FU
E6	TC7SU04FU
LD	2SC2462-LD-T
HA	TC7SH14FU
H6	TC4SHU04FU
H9	UMH9N
F7	KV1470
K	DA221
MO	MA132WA
3.0L	MA3030

*VOLTAGE: REC MODE

2-4 Process [PC] Schematic Diagram (For Printing) **A-b**

PROCESS [PC]

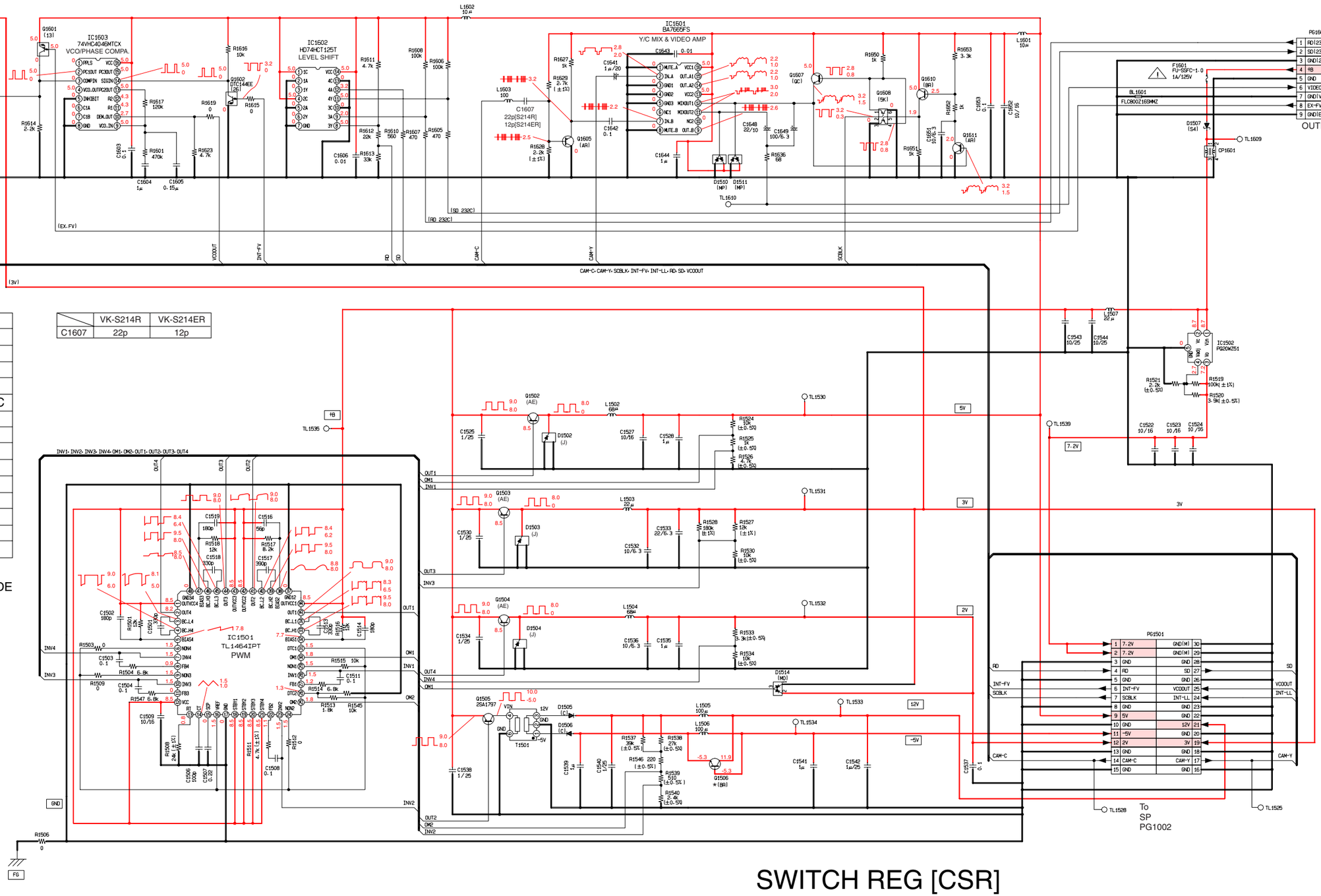


2-5 Switch Reg [CSR] Schematic Diagram

CODE	PART NAME
AE	2SB1424
AR	2SB1462
BR	2SC4081
* BR	2SC4617
QC	2SC2620-QC
13	DTA143EE
26	DTC144EE
64	DTC114YE
5K	XP4401
C	1SS353
J	SB07-03C
MO	MA132WA
MP	MA133
S4	D1FS4

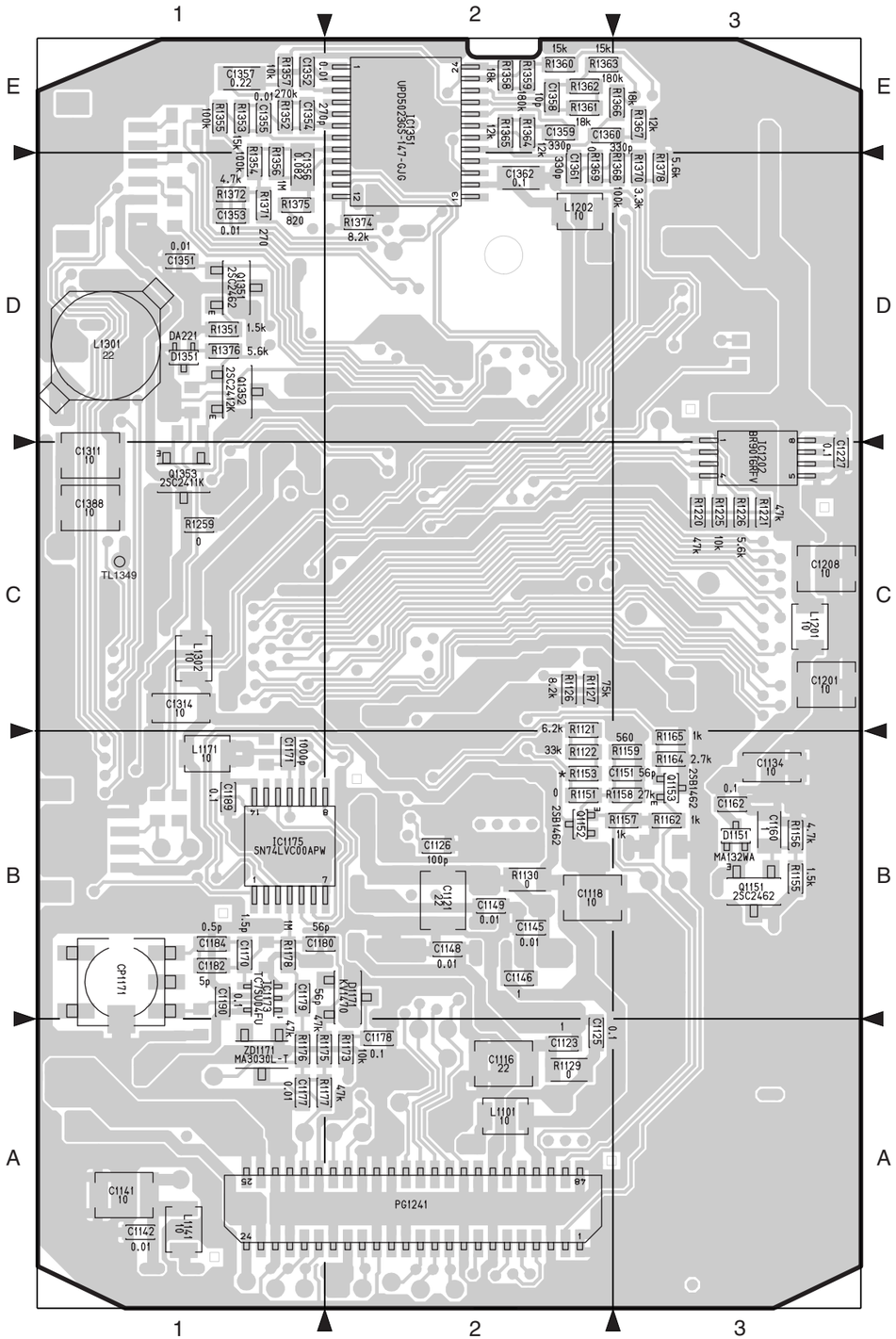
	VK-S214R	VK-S214ER
C1607	22p	12p

* VOLTAGE: REC MODE



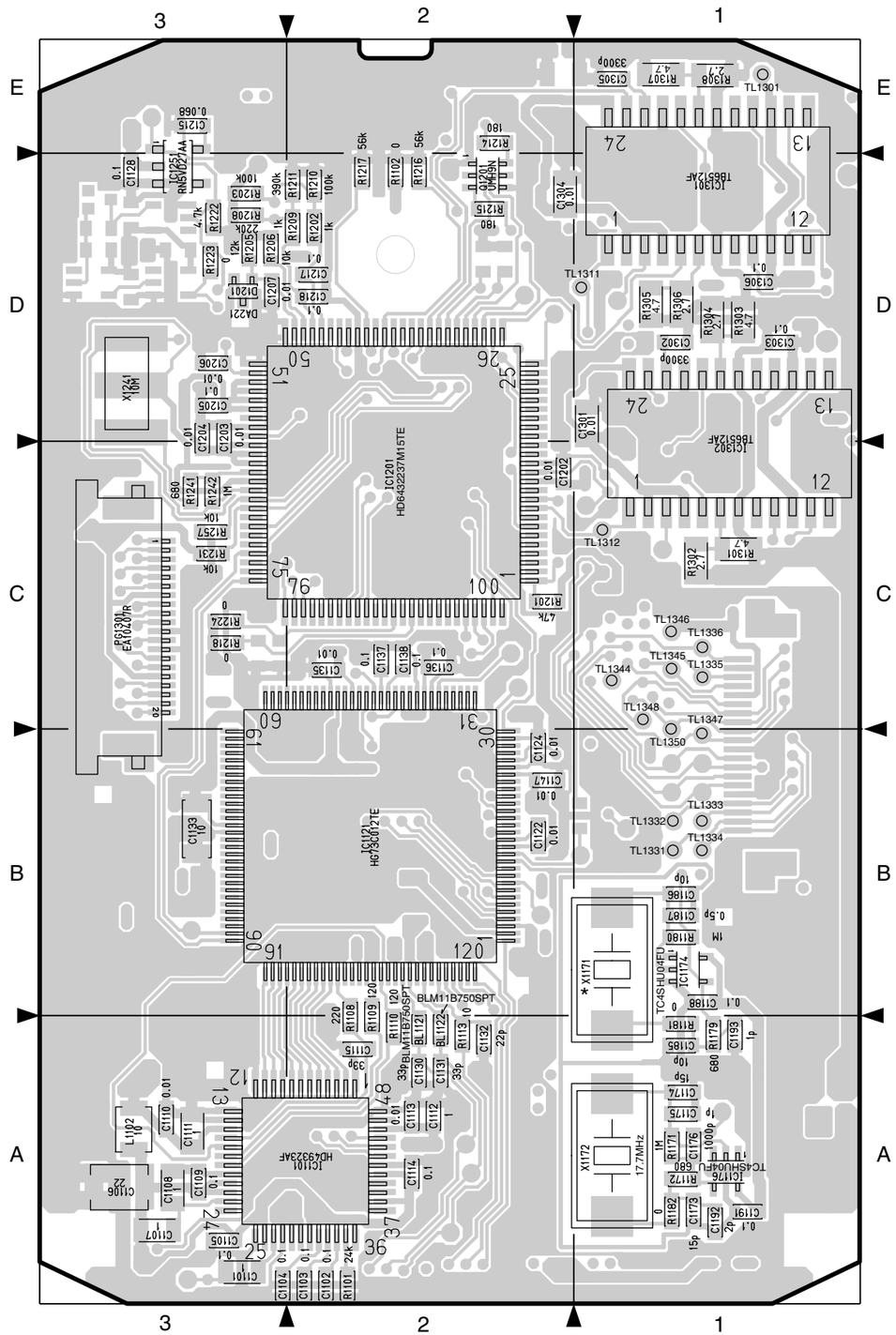
SWITCH REG [CSR]

3 Circuit Board Diagrams
3-1 PC Circuit Board Diagram



	VK-S214R	VK-S214ER
R1153	22	0

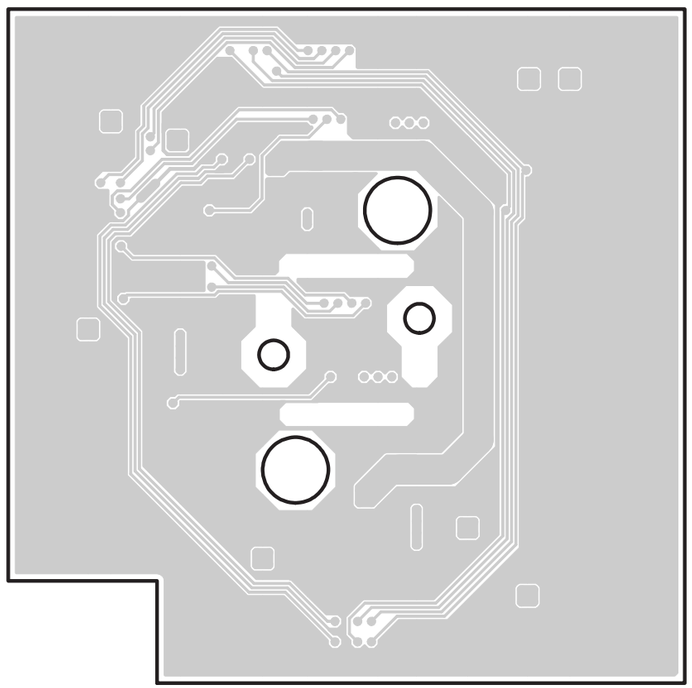
PC -SIDE A-
[PATTERN No.JA2065-2]



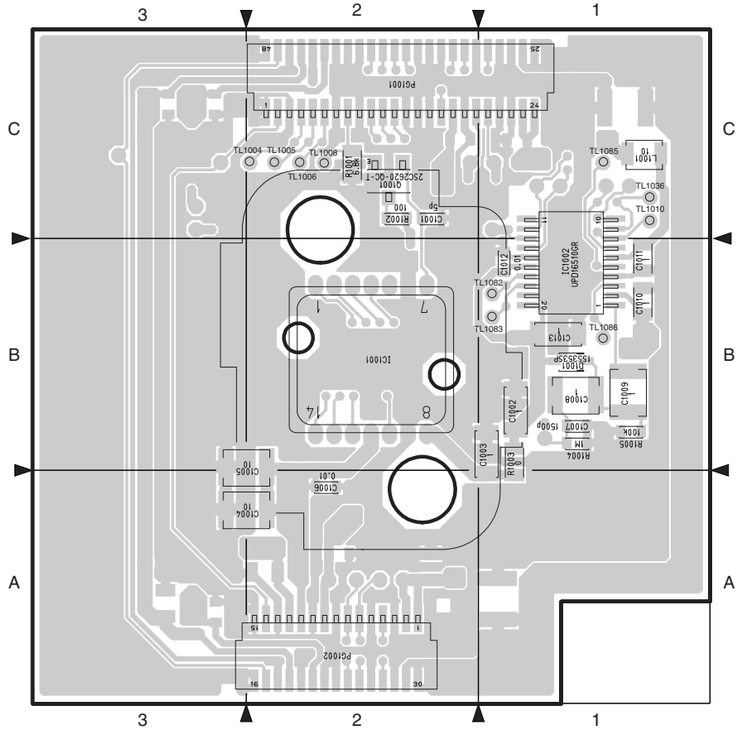
	VK-S214R	VK-S214ER
X1171	28.6MHz	28.5MHz

PC -SIDE B-
[PATTERN No.JA2065-2]

3-2 SP Circuit Board Diagram



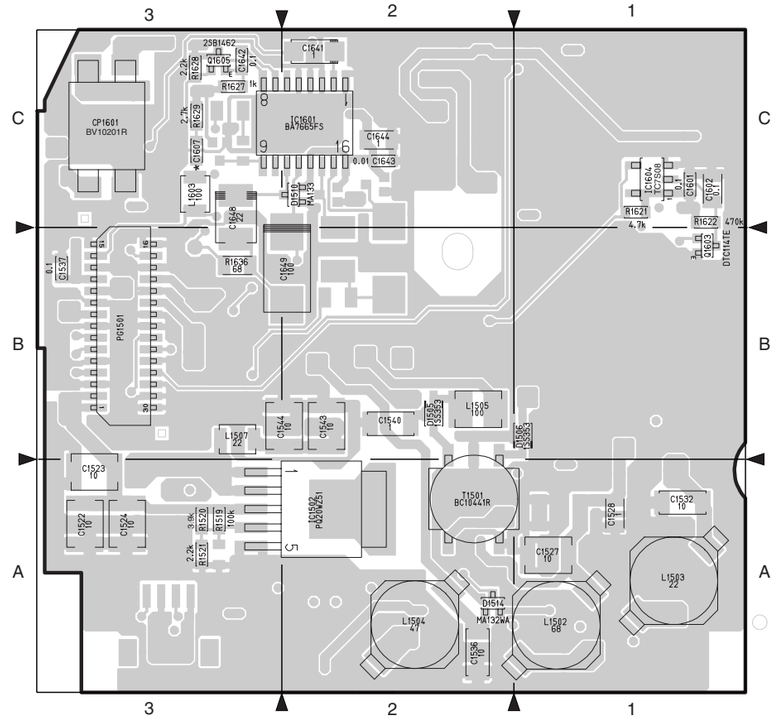
SP -SIDE A-
[PATTERN No.JA2065-2]



	VK-S214R	VK-S214ER
IC1001	ICX228AK-K	ICX229AK-K

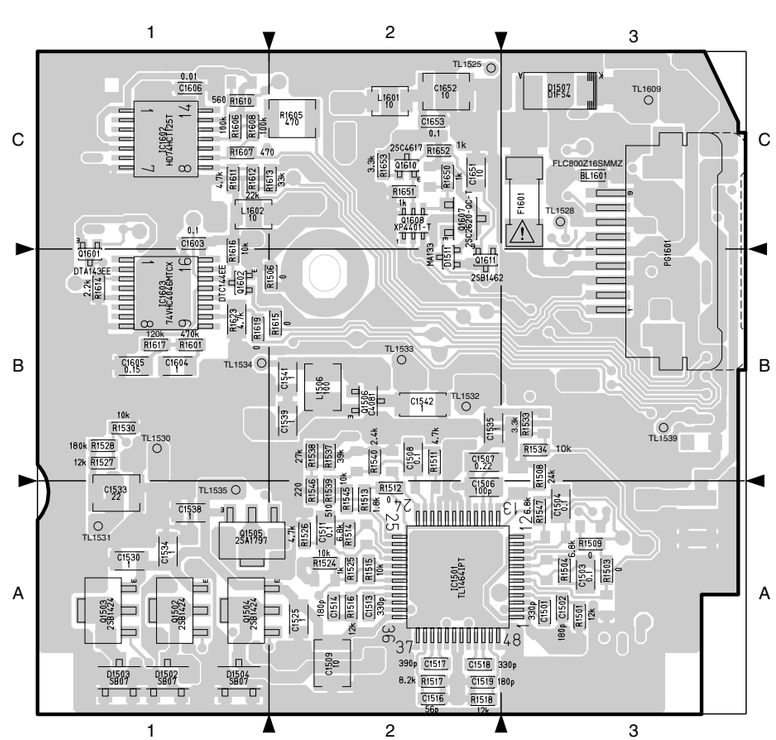
SP -SIDE B-
[PATTERN No.JA2065-2]

3-3 CSR Circuit Board Diagram



	VK-S214R	VK-S214ER
C1607	22p	12p

CSR -SIDE A-
[PATTERN No.JA2065-2]



CSR -SIDE B-
[PATTERN No.JA2065-2]

3-4 Identification of Parts Location

PC

Symbol No.	Parts Location
BL	
BL1121	B-2A
BL1122	B-2A
C	
C1101	B-3A
C1102	B-2A
C1103	B-2A
C1104	B-3A
C1105	B-3A
C1106	B-3A
C1107	B-3A
C1108	B-3A
C1109	B-3A
C1110	B-3A
C1111	B-3A
C1112	B-2A
C1113	B-2A
C1114	B-2A
C1115	B-2A
C1116	A-2A
C1118	A-2B
C1121	A-2B
C1122	B-2B
C1123	A-2A
C1124	B-2B
C1125	A-2A
C1126	A-2B
C1128	B-3D
C1130	B-2A
C1131	B-2A
C1132	B-2A
C1133	B-3B
C1134	A-3B
C1135	B-2C
C1136	B-2C
C1137	B-2C
C1138	B-2C
C1141	A-1A
C1142	A-1A
C1145	A-2B
C1146	A-2B
C1147	B-2B
C1148	A-2B
C1149	A-2B
C1151	A-3B
C1160	A-3B
C1162	A-3B
C1170	A-1B
C1171	A-1B
C1173	B-1A
C1174	B-1A
C1175	B-1A
C1176	B-1A
C1177	A-1A
C1178	A-2A
C1179	A-1B
C1180	A-1B
C1182	A-1B
C1184	A-1B
C1185	B-1A
C1186	B-1B
C1187	B-1B
C1188	B-1B
C1189	A-1B
C1190	A-1B
C1191	B-1A
C1192	B-1A
C1193	B-1A
C1201	A-3C
C1202	B-2C
C1203	B-3D
C1204	B-3D
C1205	B-3D
C1206	B-3D
C1207	B-3D
C1208	A-3C
C1215	B-3E
C1217	B-2D
C1218	B-2D
C1227	A-3C
C1301	B-1D
C1302	B-1D
C1303	B-1D
C1304	B-2D
C1305	B-1E
C1306	B-1D
C1311	A-1C
C1314	A-1C
C1351	A-1D
C1352	A-1E
C1353	A-1D
C1354	A-1E
C1355	A-1E
C1356	A-1D
C1357	A-1E
C1358	A-2E
C1359	A-2E
C1360	A-2E
C1361	A-2D
C1362	A-2D
C1388	A-1C
CP	
CP1171	A-1B
D	
D1151	A-3B
D1171	A-2B
D1201	B-3D
D1351	A-1D
IC	
IC1101	B-2A
IC1121	B-2B
IC1173	A-1B
IC1174	B-1B
IC1175	A-1B
IC1176	B-1A
IC1201	B-2C
IC1202	A-3C
IC1251	B-3D
IC1301	B-1D
IC1302	B-1C
IC1351	A-2E
L	
L1101	A-2A
L1102	B-3A
L1141	A-1A
L1171	A-1B
L1201	A-3C
L1202	A-2D
L1301	A-1D
L1302	A-1C
PG	
PG1241	A-2A
PG1301	B-3C
Q	
Q1151	A-3B
Q1152	A-2B
Q1153	A-3B
Q1201	B-2D
Q1351	A-1D
Q1352	A-1D
Q1353	A-1C
R	
R1101	B-2A
R1102	B-2D
R1108	B-2A
R1109	B-2A
R1110	B-2A
R1113	B-2A
R1121	A-2B
R1122	A-2B
R1126	A-2C
R1127	A-2C
R1129	A-2A
R1130	A-2B
R1151	A-2B
R1153	A-2B
R1155	A-3B
R1156	A-3B
R1157	A-3B
R1158	A-3B
R1159	A-3B
R1162	A-3B
R1164	A-3B
R1165	A-3B
R1171	B-1A
R1172	B-1A
R1173	A-2A
R1175	A-1A
R1176	A-1A
R1177	A-1A
R1178	A-1B
R1179	B-1A
R1180	B-1B
R1181	B-1A
R1182	B-1A
R1201	B-2C
R1202	B-2D
R1203	B-3D
R1205	B-3D
R1206	B-3D
R1208	B-3D
R1209	B-2D
R1210	B-2D
R1211	B-2D
R1214	B-2E
R1215	B-2D
R1216	B-2D
R1217	B-2D
R1218	B-3C
R1220	A-3C
R1221	A-3C
R1222	B-3D
R1223	B-3D
R1224	B-3C
R1225	A-3C
R1226	A-3C
R1231	B-3C
R1241	B-3C
R1242	B-3C
R1257	B-3C
R1259	A-1C
R1301	B-1C
R1302	B-1C
R1303	B-1D
R1304	B-1D
R1305	B-1D
R1306	B-1D
R1307	B-1E
R1308	B-1E
R1351	A-1D
R1352	A-1E
R1353	A-1E
R1354	A-1D
R1355	A-1E
R1356	A-1D
R1357	A-1E
R1358	A-2E
R1359	A-2E
R1360	A-2E
R1361	A-2E
R1362	A-2E
R1363	A-2E
R1364	A-2E
R1365	A-2E
R1366	A-3E
R1367	A-3E
R1368	A-3D
R1369	A-2D
R1370	A-3D
R1371	A-1D
R1372	A-1D
R1374	A-2D
R1375	A-1D
R1376	A-1D
R1378	A-3D
TL	
TL1301	B-1E
TL1311	B-1D
TL1312	B-1C
TL1331	B-1B
TL1332	B-1B
TL1333	B-1B
TL1334	B-1B
TL1335	B-1C
TL1336	B-1C
TL1344	B-1C
TL1345	B-1C
TL1346	B-1C
TL1347	B-1B
TL1348	B-1C
TL1349	A-1C
TL1350	B-1B
X	
X1171	B-1B
X1172	B-1A
X1241	B-3D
ZD	
ZD1171	A-1A

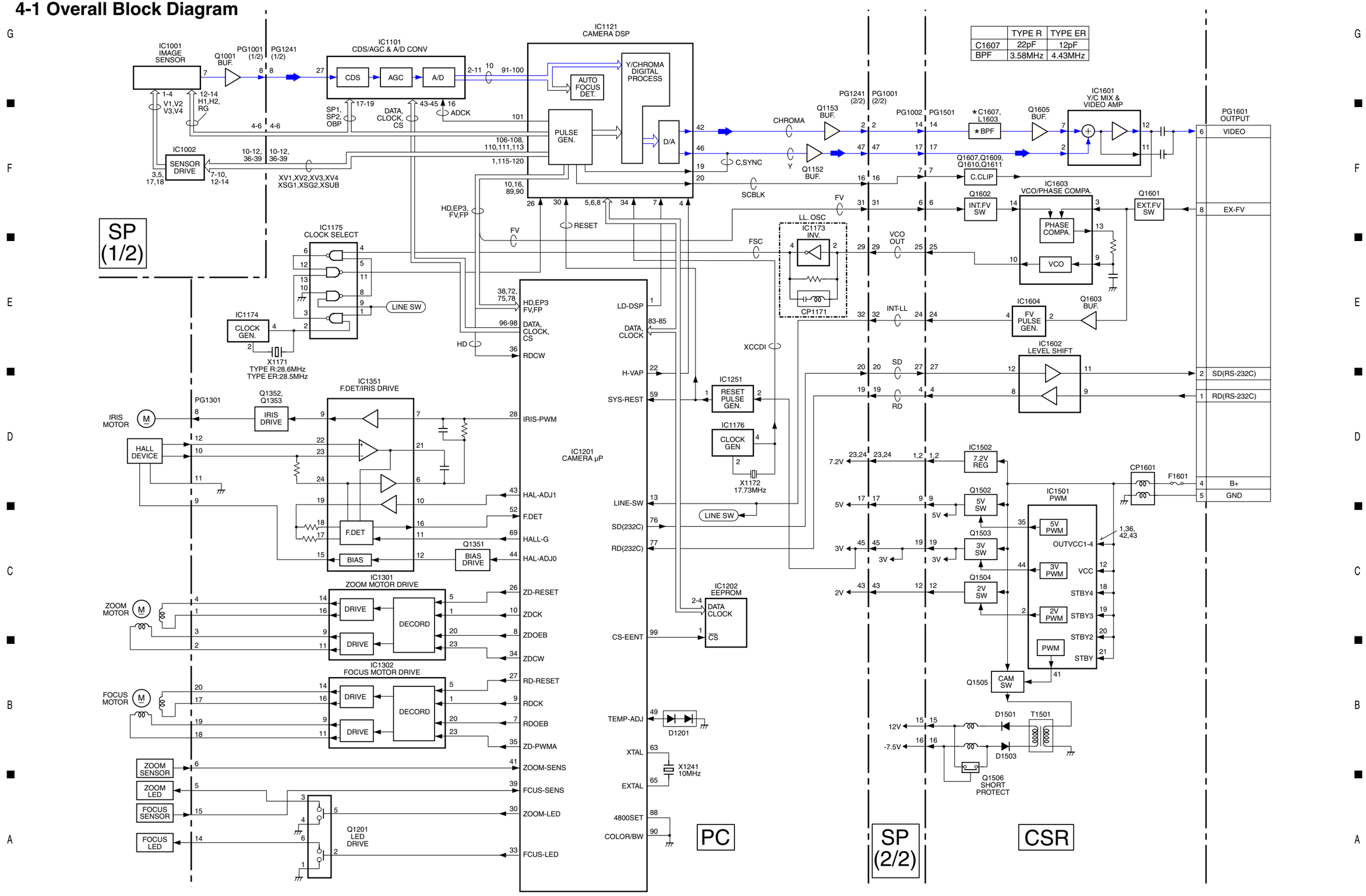
SP

Symbol No.	Parts Location
C	
C1001	B-2C
C1002	BÅ-1B
C1003	B-1B
C1004	B-2A
C1005	B-2B
C1006	B-2A
C1007	B-1B
C1008	B-1B
C1009	B-1B
C1010	B-1B
C1011	B-1B
C1012	B-1B
C1013	B-1B
D	
D1001	B-1B
IC	
IC1001	B-2B
IC1002	B-1B
L	
L1001	B-1C
PG	
PG1001	B-2C
PG1002	B-2A
Q	
Q1001	B-2C
R	
R1001	B-2C
R1002	B-2C
R1003	B-1B
R1004	B-1B
R1005	B-1B
TL	
TL1004	B-2C
TL1005	B-2C
TL1006	B-2C
TL1008	B-2C
TL1010	B-1C
TL1036	B-1C
TL1082	B-1B
TL1083	B-1B
TL1085	B-1C
TL1086	B-1B

CSR

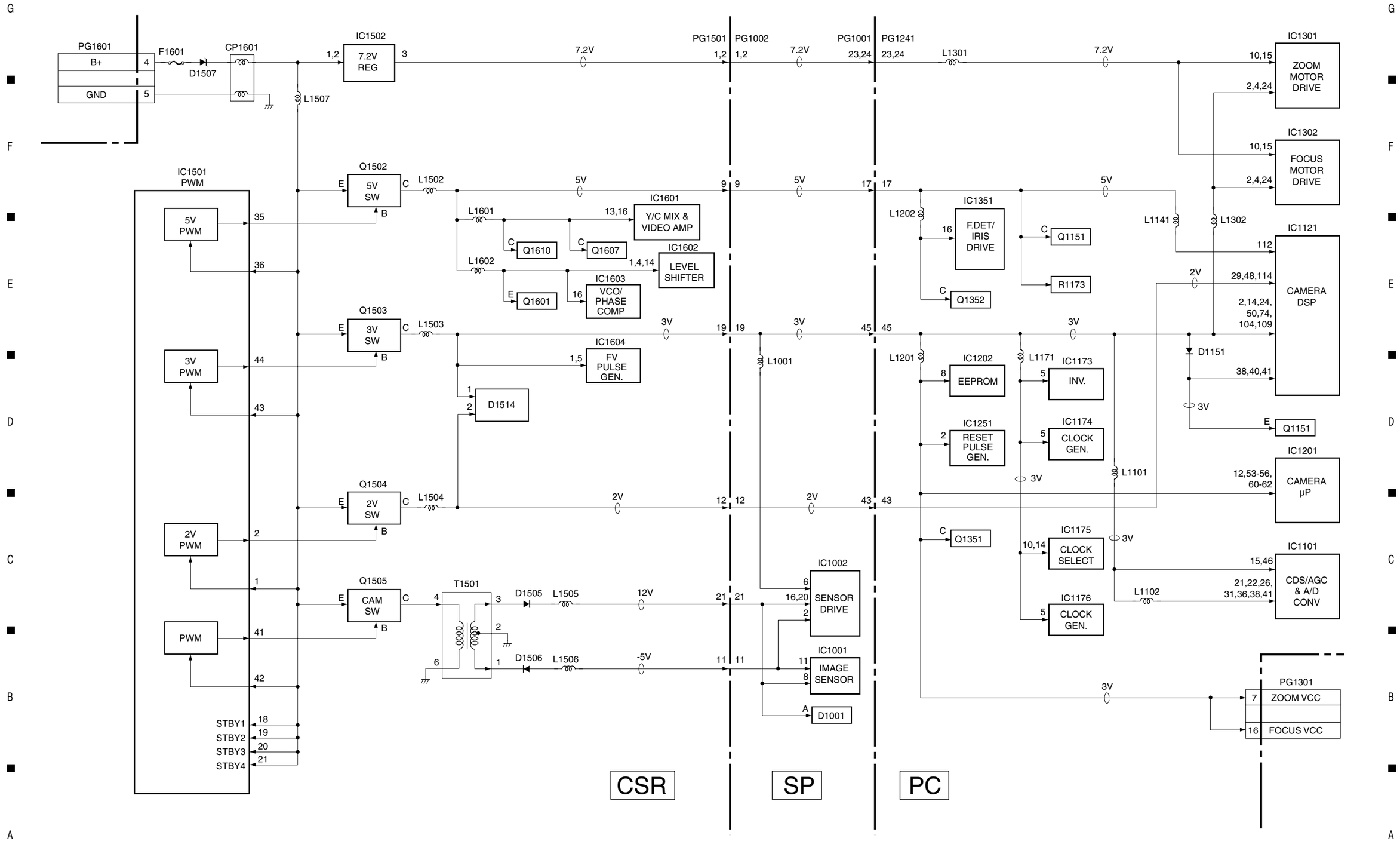
Symbol No.	Parts Location
BL	
BL1601	B-3C
C	
C1501	B-3A
C1502	B-3A
C1503	B-3A
C1504	B-3A
C1506	B-2A
C1507	B-2B
C1508	B-2B
C1509	B-2A
C1511	B-2A
C1513	B-2A
C1514	B-2A
C1516	B-2A
C1517	B-2A
C1518	B-2A
C1519	B-2A
C1522	A-3A
C1523	A-3A
C1524	A-3A
C1525	B-2A
C1527	A-1A
C1528	A-1A
C1530	B-1A
C1532	A-1A
C1533	B-1A
C1534	B-1A
C1535	B-2B
C1536	A-2A
C1537	A-3B
C1538	B-1A
C1539	B-2B
C1540	A-2B
C1541	B-2B
C1542	B-2B
C1543	A-2B
C1544	A-2B
C1601	A-1C
C1602	A-1C
C1603	B-1C
C1604	B-1B
C1605	B-1B
C1606	B-1C
C1607	A-3C
C1641	A-2C
C1642	A-3C
C1643	A-2C
C1644	A-2C
C1648	A-3C
C1649	A-2B
C1651	B-2C
C1652	B-2C
C1653	B-2C
CP	
CP1601	A-3C
D	
D1502	B-1A
D1503	B-1A
D1504	B-1A
D1505	A-2B
D1506	A-1B
D1507	B-3C
D1510	A-2C
D1511	B-2B
D1514	A-2A
F	
F1601	B-3C
IC	
IC1501	B-2A
IC1502	A-2A
IC1601	A-2C
IC1602	B-1C
IC1603	B-1B
IC1604	A-1C
L	
L1502	A-1A
L1503	A-1A
L1504	A-2A
L1505	A-2B
L1506	B-2B
L1507	A-3B
L1601	B-2C
L1602	B-1C
L1603	A-3C
PG	
PG1501	A-3B
PG1601	B-3B
Q	
Q1502	B-1A
Q1503	B-1A
Q1504	B-1A
Q1505	B-1A
Q1506	B-2B
Q1601	B-1B
Q1602	B-1B
Q1603	A-1B
Q1605	A-3C
Q1607	B-2C
Q1608	B-2C
Q1610	B-2C
Q1611	B-2B
R	
R1501	B-3A
R1503	B-3A
R1504	B-3A
R1506	B-2B
R1508	B-3B
R1509	B-3A
R1511	B-2B
R1512	B-2A
R1513	B-2A
R1514	B-2A
R1515	B-2A
R1516	B-2A
R1517	B-2A
R1518	B-2A
R1519	A-3A
R1520	A-3A
R1521	A-3A
R1524	B-2A
R1525	B-2A
R1526	B-2A
R1527	B-1B
R1528	B-1B
R1530	B-1B
R1533	B-3B
R1534	B-3B
R1537	B-2B
R1538	B-2B
R1539	B-2A
R1540	B-2B
R1545	B-2A
R1546	B-2A
R1547	B-3A
R1601	B-1B
R1605	B-2C
R1606	B-1C
R1607	B-1C
R1608	B-1C
R1610	B-1C
R1611	B-1C
R1612	B-1C
R1613	B-1C
R1614	B-1B
R1615	B-2B
R1616	B-1B
R1617	B-1B
R1619	B-1B
R1621	A-1C
R1622	A-1C
R1623	B-1B
R1627	A-3C
R1628	A-3C
R1629	A-3C
R1636	A-3B
R1650	B-2C
R1651	B-2C
R1652	B-2C
R1653	B-2C
T	
T1501	A-2A
TL	
TL1525	B-2C
TL1528	B-3C
TL1530	B-1B
TL1531	B-1A
TL1532	B-2B
TL1533	B-2B
TL1534	B-1B
TL1535	B-1A
TL1539	B-3B
TL1609	B-3C

4. Block Diagrams
4-1 Overall Block Diagram



	TYPE R	TYPE ER
C1607	22pF	12pF
BPF	3.58MHz	4.43MHz

4-2 Powe Block Diagram



VK-S214R/S214ER

HITACHI

VK-S214R/S214ER

VK-S214R
VK-S214ER

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